american aircraft modeler

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MARCH 1975
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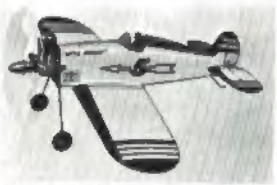

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Kit 72 **SUPER STUNTMASTER** 20". A built-up wing stunt sensation.

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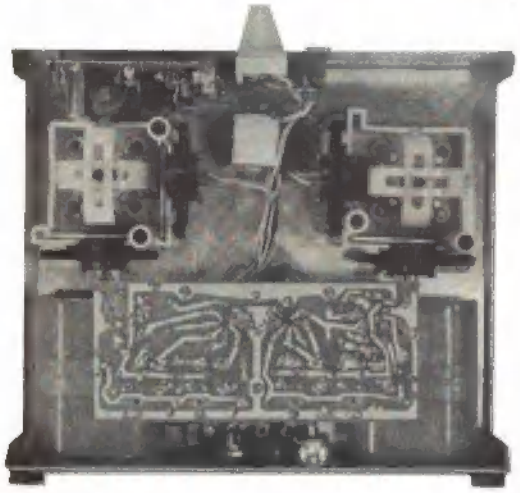
HOBBY LOBBY'S $219 RADIO:



- Its transmitter is as powerful as the transmitters in some $400 radios,
- It has the same precise adjustable-tension control sticks that some $379 radios have,

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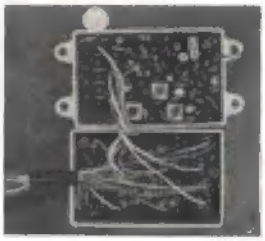

- The Hobby Lobby 5's servo amplifiers produce servo centering and resolution just as accurate as those in some $480 radios, and they use less current than the $480 amplifiers,

- Its temperature-compensated 3 wire servo amplifiers give accurate control of a contest airplane in any weather--a feature that you'll also get in some $490 radios,
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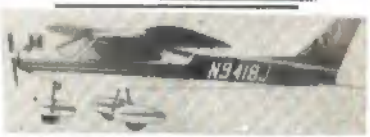

"A.T. ADVANCED TRAINER" 50" span, for .19 engines, a sharp kit for your first aileron (4 channel) airplane.

List Price $34.95 HOBBY LOBBY PRICE *$24.97*

Book THE "CRASHLESS WAY TO ADVANCED RADIO CONTROL FLYING *$4.95*

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NEW!
Midwest Products
PITTS SPECIAL
List price $89.95
HOBBY LOBBY PRICE *$69.97*

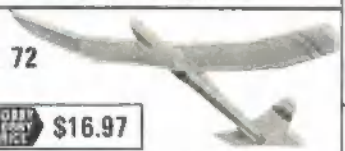
Sport scale version of Soucy's World Champ Pitts, Jerry Nelson designed the prototype for this kit. 48" span, but a rather large 6 or 7 pound model airplane because the PITTS has stubby wings relative to the fuselage. For 4 channels, .40-.61 power. Will be a very deluxe and well-organized kit.

NEW! Bridi T-20 TRAINER

45" span, 3 or 4 channels, for .15-.25 engine.

List Price $34.95 HOBBY LOBBY PRICE *$26.47*

Airtronics
SQUARE SOAR 72
R C SAILPLANE



List price $19.76 HOBBY LOBBY PRICE **$16.97**

71 1/2" span, 500 sq. in. for 2 channels--fits "bricks" or 1 channel pulse
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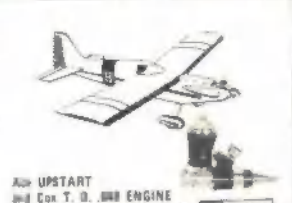

[illegible] UPSTART and Cox T. D. .049 ENGINE
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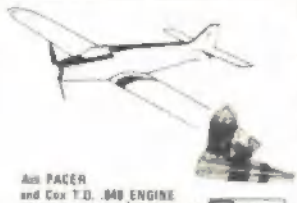

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Mark's Models BUSHWACKER and Fox .19 RC ENGINE
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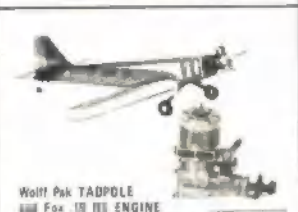

Wolff Pak TADPOLE and Fox .19 [illegible] ENGINE
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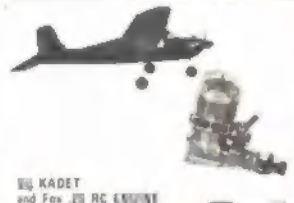

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VOLUME 75, NUMBER 3
MARCH 1975

COVER STORY

Mink-garbed Vikki Johnson proclaims that the bipe is back. The most modeled biwinger ever is definitely Lew Andrews' Aeromaster. This superb kit is available again. *(Photo courtesy AAMCO. Photographer: Phil Roddey).* For our own presentation of a dreamy super-bipe, see the Senior Aero Sport article on page 18.

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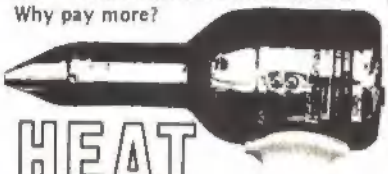

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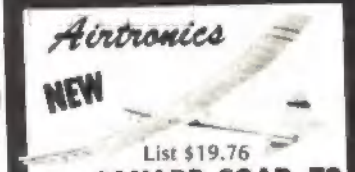

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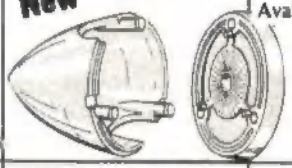

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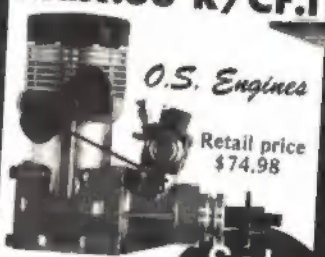

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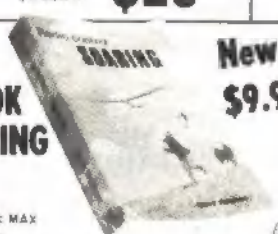

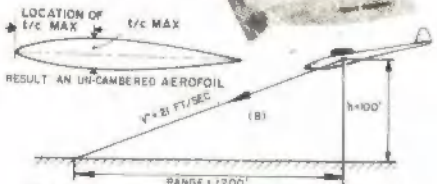

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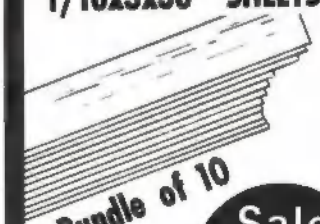

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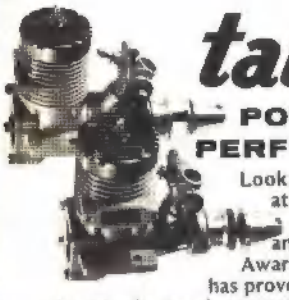

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* FLITE-KOTE Covering Material

4 New Transparant Colors!

NOW! NEW! FLITE-KOTE in beautiful transparant colors that fantastic! These new colors look like gems shinning in the sun!!! Don't wait, get yours today.

An excellent, long lasting, extremely strong yet light weight method for covering your flying machines.

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WORLD EXPERT

5CHANNEL with 4 servos

Sale $209

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SUPER VALUE

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46 inch span
414sq. in. area
.19-.23 engine
4 channel gear

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RADIO: 1 TO 3 CHANNELS

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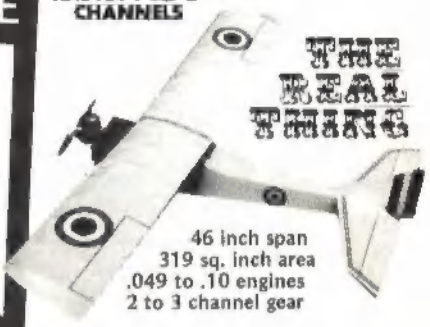

46 inch span
319 sq. inch area
.049 to .10 engines
2 to 3 channel gear

Quality die and machine cut balsa and hardwood parts, self jigging construction, quick/easy assembly and great fun to fly!

$11.99

BO-209 MONSUN NEW

SEMI-SCALE R/C POWER MODEL with illustrated plans, planked ready formed wing parts, plastic cowling and interior parts, engine/nose gear mount with steerable nose gear, hardware, cement, decals and misc. parts.
WING SPAN: 62¼ inches
WING AREA: 537 sq. inches

Hobby Shack DISCOUNT PRICE

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COX ENGINES

Medallion T.D. 049 or 051

RETAIL $18.50!

Screened venturi for protection against dirt, etc. Front rotary valve

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No more dead batteries with this chargable wet cell and charger. Onced charged you'll get lot's of quick starts. Buy now for big savings!

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Little Gasser

Designed for .049 economy & fun. Try it, you'll like it!

A real Gas! Lots of fun at the field with the Little Gasser from the 'Shack'! Span: 42 inches, Area: 275sq. inches. Fly it w/ 2 to 3 channels and .049 power, . .how's that for economy? An all balsa kit.

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Our catalog is packed end to end with the finest kits, tools, accessories, engines, radio systems, and supplies. Over 100 pages long with many full color pictures. Plus, inside to help the novice, are articles to help him (or her) with a few basics of modeling.

We think it's the best there is and recommend it as important to every modeler's library. Ordering by mail is fun and easy, and you can shop right from your easy chair.

☐ I am enclosing $2.50 (check or M.O.) for your fully illustrated modeler's catalog. Please rush it to me today.

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For the fun of it...

. . .if that is why you build and fly model airplanes, **Sport Modeler** magazine is for you. It's a brand-new magazine for the sport modeler and Sunday flier. Edited by Bill Winter, it contains top-draw plans for RC, CL, and FF designs that are great to build and a pleasure to fly. Each issue is written to help your modeling to be easier, more original, more interesting—and more fun. It is packed with how-to-do-it's, techniques, new and unique features, cut-away drawings in the grand manner. The finest designers, writers, artists and innovative minds in the land tell you what you need to know—and then some. Stops just short of the ultra-complex—may even show the competition flier a thing or two! SM's the friendly magazine. Try it—you'll like it.

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In this issue:

Showing the Flag at the West Coast Classic

Ugly Bug, Hot Machine

Sr. Falcon and Cloth of Kings

ALSO IN THIS ISSUE:

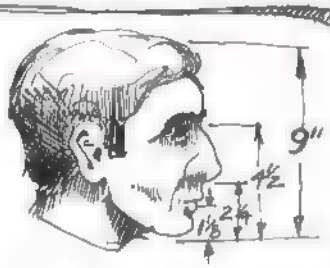
Peanut Scale in a Nutshell; Aerodrome Ready Kit; How to Convert Rubber Scale to Gas; Automatic Flight Pack Monitor; That First Flight, What Then?; Our regular features . . . Glenn Lee on Engines; Jim Newman's Bench Wisdom and much more!

"A FLYING MODEL WITHOUT A PILOT IS JUST NOT COMPLETE"....
ED SWEENEY

Pilot

WRITTEN BY PAT MARCH ART/ALAN HOEWELER

ED'S RIGHT; SPITFIRES JUST DON'T FLY THEMSELVES, THEY'VE GOT PILOTS, SO!...SO SHOULD YOUR MODELS. LET IT BE A SIMPLE PAPER PROFILE FOR PEANUT SCALE AND LIGHT OUTDOOR MODELS, BUT MORE ELABORATE MODELS DESERVE MORE ELABORATE PILOTS. SO PAY ATTENTION TO THE OLD MODELER AND LEARN HOW TO MAKE PILOTS. G.I. JOE IS OK, BUT

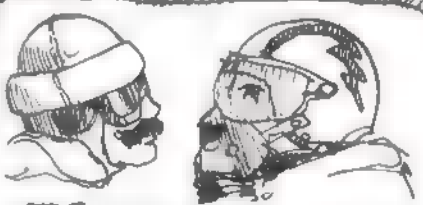


IF YOU MAKE YOUR OWN HE CAN BE DOUG BADER, ED HEATH, STEVE CANYON, SNOOPY, OR EVEN YOU!

YOU'VE GOTTA LAY OUT THE PILOT LIKE A SCALE MODEL (WHICH HE IS). THESE PIX GIVE YOU LOTS OF AVERAGE FULL SCALE DIMENSIONS.

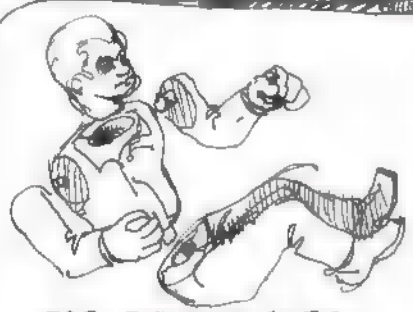
BUT YOU DON'T NEED 'EM. SCALE YOURSELF DOWN AND USE A MIRROR TO WORK OUT DETAILS.

PILOT'S EQUIPMENT IS ALSO IMPORTANT, VARYING FROM SCARVES TO BREECHES TO ELECTRICALLY HEATED "G" SUITS.

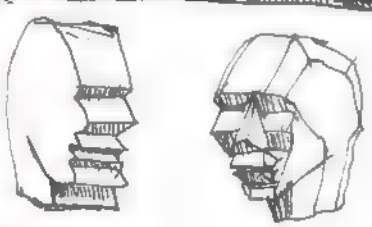


FOR EQUIPMENT DETAILS, YOU'LL HAVE TO DO SOME HOMEWORK! LIBRARIES AND AVIATION MAGS ARE GOOD SOURCES.

MATERIALS ARE IMPORTANT. FOR QUICKY OR ULTRA-LIGHT PILOTS, FOAM PLASTIC WILL SERVE. EXPANDED STYRENE IS OK, BUT URETHANE FOAM IS BETTER & EASIER TO WORK INTO SHAPE. URETHANE IS OBTAINED FROM: MODEL MATERIALS CO, 119 MARIPOSA, WAUKEGAN ILL.; ASK FOR "PRO FOAM".



FOR STILL BETTER RESULTS, PATTERN PINE IS GREAT! PINE HEAD COMBINED W/ FOAM BODY AND LIMBS COMES CLOSE TO BEING IDEAL, CHECK PHONE BK. FOR PATTERN SHOPS & SCROUNGE FOR SCRAPS.



LAY OUT AND START CARVING ON THE HEAD. DON'T BE SCARED, TO CARVE, IT'S JUST ANOTHER SCALE MODEL. ROUGH IT OUT, THEN REFINE IT USING YOURSELF AS A GUIDE. IF YOU GET REAL GOOD...

YOU CAN ADD EXPRESSIONS. PILOTS' DON'T MERELY SIT UPRIGHT LOOKING STRAIGHT AHEAD, THEY SQUINT, LOOK OVER THE SIDE AND BECOME SURPRISED, ANGRY, & EXCITED. AT LEAST TURN HIS HEAD AND TILT IT AWAY FROM RIGID ATTENTION.

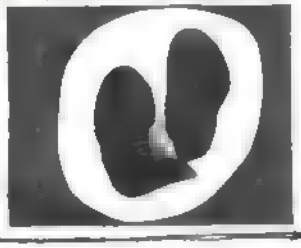
HERE'S ED HEATH'S HEAD, AT 1"= 1' SCALE BOY! HAS HE GOT EXPRESSION!

THE HEAD IS PINE, BUT EARS AND HAIR ARE BUILT UP OF STRINGS OF AMBROID. BODY & LIMBS ARE FOAM.

FOLDS IN CLOTHING ARE CUT IN WITH KNIFE & SANDPAPER - STUDY FOLDS IN YOUR OWN CLOTHES AS GUIDES

ED'S HANDS ARE ALSO PINE. HANDS ARE BITCHY TO MAKE, BETTER TO HIDE THEM SO THEY DON'T NEED TO BE TOO GREAT!!

ED ALSO HAS SHOES & SOX. BALSA DOES FINE FOR THESE.



BEFORE FINAL ASSEMBLY A PILOT SHOULD BE PAINTED. THE FACE IS THE HARDEST!

A FILLER PRIMER SHOULD BE USED, FOLLOWED BY AN ALL OVER COAT OF FLESH. THEN HIGHLIGHTS, SHADOWS REDNESS, EYE BALLS ARE PAINTED IN WITH A LIGHTENED FLESH COLOR (NOT DEAD WHITE) LIPS ARE NOT BRIGHT RED, BUT A REDDER SHADE OF FLESH. EYE BROWS AND LASHES ARE BEST ADDED WITH PENCIL OR FINE LINE FELT MARKER.

ACRYLIC PAINTS OR ARTIST OILS ARE SUPERIOR TO DOPE OR ENAMELS FOR FLESH COLORS.

PUPILS CAN BE PAINTED, OFTEN, HOWEVER THEY ARE BEST REPRESENTED BY PIN HOLES OR DRILLED HOLES.

EXTREME CARE IS NEEDED IN LOCATING PUPILS TO AVOID A COCKEYED EXPRESSION.

ED'S GOGGLES ARE VAC-U-FORMED FROM THIN CLEAR PLASTIC. NO FINISH WAS APPLIED TO HIS COVERALLS.

HERE'S A PILOT WITH MORE ELABORATE COSTUMING THAN ED HEATH. HELMET IS CARVED INTEGRAL WITH THE HEAD. FUR COLLAR IS FLEXIBLE, FOAM. MAE WEST IS OF ORANGE PAPER TRIMMED WITH MONO-KOTE.

PARACHUTE HARNESS IS SHOELACE W/PAPER CLIP & THUMBTACK FITTINGS.

"SKONK WORKS"

BODY IS URETHANE FOAM, PRIMED W/DOPE-TALCUM MIX. FINISHED WITH RAF BLUE DOPE

NOW! YOU KNOW AS MUCH ABOUT MAKING PILOTS AS THE OLD MODELER DOES..... SO GO TO IT!

Do Modelers Have Rights? ...Yes

/by Ed Hagstrom

(Reprinted courtesy *Prop Wash*, the newsletter of the Minneapolis Piston Poppers.)

June 20 was a quiet evening—for awhile anyway! My son, I, and some friends with whom I fly regularly, had met at the Carl Sandburg School parking lot to fly for an hour or so. We had put up a few flights, when I gave my just-completed and untried Scale Gee Bee a try. It was a gamble, for the real thing flew like ■ rock, and so I wondered how the model would fly. To my surprise, it flew great.

Then, on the second flight, things started to happen. A car came into the lot (not unusual) and my friend stepped in front of it to warn the driver of the plane in the air and the area of the control line circle. Then he stepped aside to watch the flight and, to our surprise, the car drove into the circle next to me—not unusual!!

I told him of the airplane and asked if he would please move, but all he said was he had every right to be here, too, that it was a public lot. The lot is at least two blocks long and 150 ft. wide; some of our club members have flown there for 20 years, and I have been flying there for the last three without complaints from anyone. My friends and son asked if he would at least get his car out of the circle, so we could land the plane safely and leave. He still insisted that he had every right to be there. I realized my gas must be about to run out and I'd have to do something fast, so I started to walk slowly away, but he turned his car and followed, not giving me a chance. By now, the plane was flying over the people on one side and his car in the middle. To avoid hurting anyone, I slowed the plane and stalled it, hoping the crash would not be too severe. . .it ▬ totaled!

Needless to say, the car departed quickly!

Upon the insistence of Pete Simonson, our club Secretary-Treasurer, I went (with my witnesses) to the Golden Valley Police Dept. to file ■ complaint. They advised me to file a civil suit in county conciliation court, which I did the next day. The trial was set for two months later, with a value of $150.00 put on the plane.

At the trial, only two of my four witnesses were able to appear. We told our story, then I showed the plane to the judge. We were told we would be notified, by mail, of the court's decision. The notice came two days later, saying I was awarded the full amount!

The money is nice to get—it will replace the material and I'll rebuild the Gee Bee, but I guess the best part is that, even though it is just a model plane and only a hobby, we do have some rights. . .people can't just come in and stomp on us.

Being a member of the AMA and an organized club, the Minneapolis Piston Poppers, I want to have somewhere to fly, and I don't intend to annoy anyone by creating ■ noise problem. If someone complains to you, listen and talk to them, unless he's like what I ran into (maybe they're just having a bad day), and they usually don't mind.

I think that being an AMA and chartered club member helped. At least, the trial judge must have realized that, as members of ▬ organization, we weren't out trying to cause trouble.

In telling you my story, I hope it will give someone else who runs into a situation similar to mine the courage to stand up for his rights!

Modeler's Bookshelf

by James Nordhoff

TO JOIN WITH THE EAGLES
by Rubenstein ■ Goldman
230 pages
Doubleday ■ Co.

A list of the most imporant names in world aviation and the U.S. aircraft industry would have to contain Wright and Curtiss. There's a good chance they'd pop up if the list were only two names long. This book, detailing the history of these pioneers from 1903 through the formation of the company bearing their names, and taking it up to 1965, is ■ treasure trove for scale builders. It lacks three-views, but those are fairly easily obtained.

What *To Join With the Eagles* offers in abundance is photos. . .over 350. The Travel-Air Speedwing, Helldiver, Hawk pursuit series—they're all here.

Coverage of the early Curtiss flying boats is excellent, and the collection of studies of the Jenny is absolutely fantastic. This last group is so well lighted and gives so much structural detail, that one gets the impression they were done as part of ■ maintenance manual or instruction booklet.

With the current attention given to bipes, what better place to start than with some of those superbly streamlined racers from the '20s? They have kind of ■ pattern eagerness to them, and for most variations, you wouldn't have to invert the engine! Recommended ▬ a good look ▬ the nostalgic days when pilots were more daredevils than engineers; and ■ revealing view of the planes they flew. $15.00.

FLYING HAND-LAUNCHED GLIDERS
By John Kaufman
96 pages
William Morrow ■ Co.

Here's an enthusiastic book that crams a tremendous amount of information into little space. Although it does, with great clarity, tell how to make a hand-launched glider, from wood selection through finishing the completed model, this new book performs a much more important service, too.

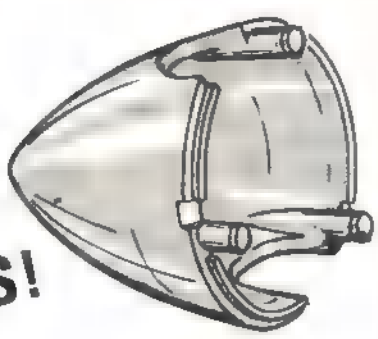
If you've ever tried this aspect of modeling, then you know that just about the hardest part of things is getting the blasted plane in the air with all its surfaces still attached. *Flying Hand-Launched Gliders* puts its emphasis where its title is, and actually explains the hows and whys of launching.

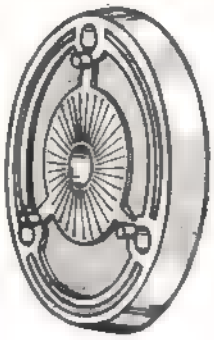
Backed by really excellent sketches, the text leads the reader through the

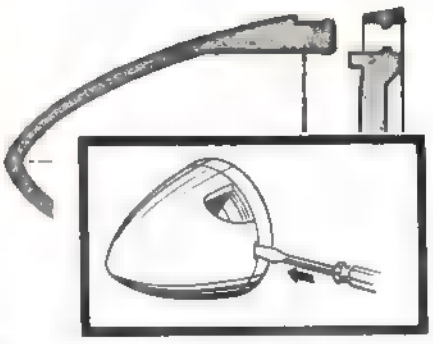
(Continued on page 85)

CARL GOLDBERG

NEW! "SNAP-ON" SPINNERS!







U.S. PATENT 3,822,138

SIMPLE TO USE, NO SCREWS OR HARDWARE REQUIRED!

At last, a spinner that works like you've always wanted! Goes on like SNAP–SNAP–SNAP! Comes off 1–2–3! No screws to tighten, no extra hardware to buy. Built to take electric starters. Over [redacted] years in development. Study the features shown here, then ask your dealer for the **CG Snap-On Spinner** – the beautiful one that does the job like no spinner ever did before!

5 COLORS

RED
WHITE
BLACK
YELLOW
BLUE

5 SIZES

1½" – .90
1¾" – 1.00
[redacted]" – 1.25
2¼" – 1.50
2½" – 1.75

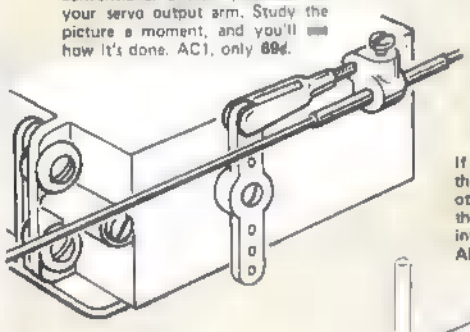
3 NEW AILERON FITTINGS!

KLETT AILERON PUSHROD EXITS

A beautiful new fairing where the aileron pushrod exits your wing. Roy Klett [redacted] has used his special quality touch to produce the finest item of its kind. [redacted] 3, [redacted] for **69¢**.

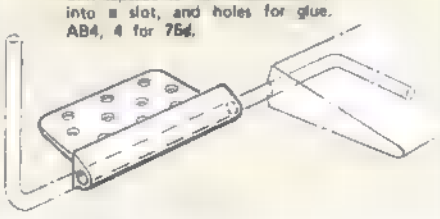
AILERON COUPLER

At last, a simple way to couple conventional aileron pushrods to your servo output arm. Study the picture a moment, and you'll [redacted] how it's done. AC1, only **69¢**.



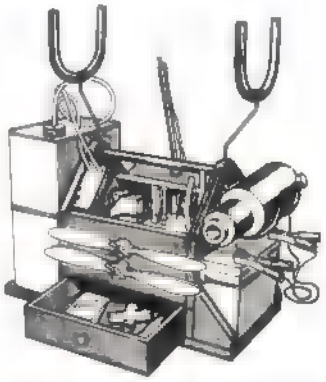
KLETT AILERON HORN BEARING

If you like precision fits, ask [redacted] see the Klett horn bearing. Superior to others, it reduces play, and has a thin tapered tab to facilitate entry into [redacted] slot, and holes for glue. AB4, 4 for **75¢**.



NEW!

THE RIGHT-AND-LIGHT FLITE BOX *HANDI-TOTE!*

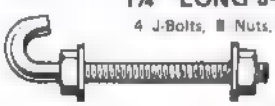


Here's the Flite Box that won't give you a hernia! Compact like you won't believe, yet [redacted] for everything you need. HANDI-TOTE was designed by [redacted] Rich, a practical modeler who flies a lot as he travels around (he's our field representative!). Kwik-Assembly kit HT1, only **$14.95**.

NEW!

1¼" LONG J-BOLTS

4 J-Bolts, [redacted] Nuts, [redacted] Washers
LJ66 [redacted]



Long J-Bolts [redacted] especially useful for holding tanks in place [redacted] illustrated here.

1/2" J-BOLTS. [redacted] [redacted] for 35¢.

NEW!

4" [redacted] 6" WIDE NYLON REINFORCING TAPE

Extremely tough when applied with epoxy.

6" wide x 5 ft. $1.00 N6
[redacted]" wide x 5 ft. 75¢ N4
2½" wide x 5 ft. [redacted] N2
3/4" wide x 5 ft. 25¢ [redacted]

For best service, see your dealer for items you want. If [redacted] available, write direct; add 50¢ per item ($1 outside U.S.). Minimum order $1.

MANUFACTURERS–All our [redacted] are available at excellent O.E.M. [redacted] prices.

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I [redacted] sending 25¢ for 8 pg. illustrated Catalog [redacted] [redacted] [redacted] of R/C Equipment and Radio Control Definitions.

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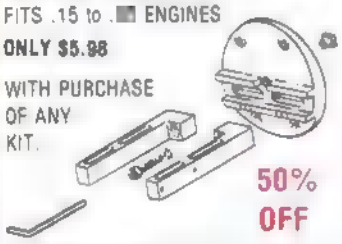

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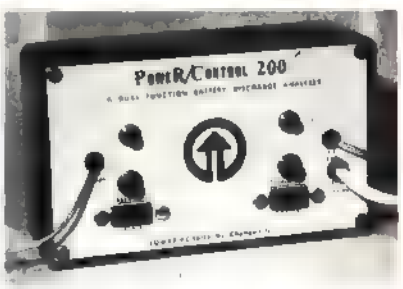

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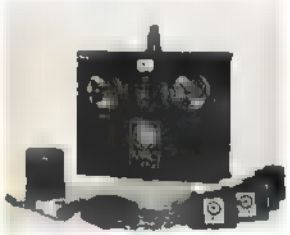

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SENIOR
AERO SPORT
N40300

Bipes ■■ beauteous...they're dramatically angular, yet subtly curved; antique in mood, but modern in spirit. They possess an eloquence that is awkwardly graceful./by Mark Frankel

With 67½" of span, the Senior Aero Sport aims for realistic flight performance—it's like a biwinged Senior Falcon in the air.

Have you ever noticed how realistically ■ really large scale model behaves in the air? As the model's size increases, its power-to-weight ratio, wing loading, and other aerodynamic characteristics (such as Reynold's number) apparently begin to approximate the full-sized aircraft's. So, in addition to the static appearance of ■ real plane, the large scale model presents the added thrill of handling like the real thing.

The Sport Biplane event, as proposed by Jerry Nelson, seems aimed at capturing some of that realism in Pattern-type competition. The NSPA rules are clearly intended to simulate the barnstorming stunts and aerobatics of full-sized aircraft, as opposed to the AMA and FAI Pattern events, which feature overpowered missiles performing feats that no man or machine could survive.

The Senior Aero Sport is an example of a large model that satisfies the philosophy of the Sport Biplane event. Furthermore, its exact scale outline allows it to compete in the AMA ■■ well as Stand-off Scale events.

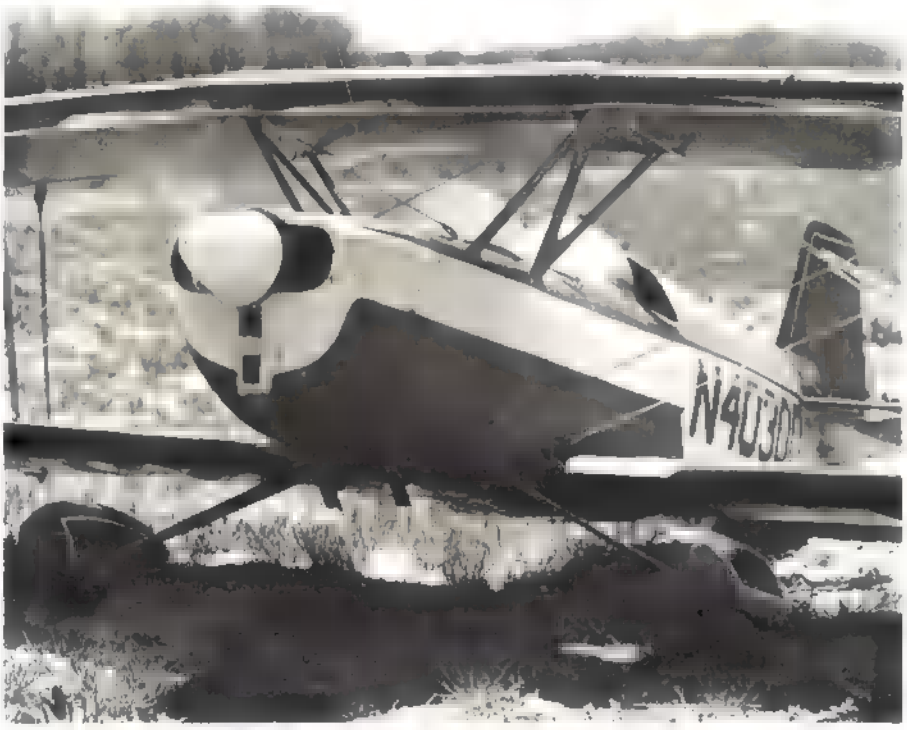
I considered building the Senior Aero Sport for several years; however, various obstacles (such as military service) kept me from undertaking the project. Fortunately, I discovered that the designer of the full-sized aircraft, Nicholas D'Apuzzo, lives in my general area. Mr. D'Apuzzo supplied me with three-view drawings of the aircraft and several photographs of various versions constructed by homebuilders across the country. He also provided me with a list of completed Senior Aero Sport projects, including the names and addresses of the builders.

It turned out that two outstanding examples, Jim Frankenfield's N112JF, and Tom Luckey's N4030Q, were hangared nearby. An inspection of these aircraft would humble even the most gifted model builder. Tom Luckey's biplane, the aircraft that I chose to model, won the "Grand Champion Homebuilt" award at the 1968 EAA International Convention. Jim Frankenfield's airplane, featuring a beautiful paint scheme, also has won many awards. It is ■ very photogenic airplane and, consequently, has been the subject of many homebuilt aircraft articles.

Tom Luckey's N4030Q is now owned by Alvin Levenson, who hangars it at Zahn's Airport on Long Island,

The author taxis the Aero Sport out for another aerobatic practice session. The shot gives ■■■ perspective of the dimensions of this 10½ lb. dream ship.

The paint scheme is dashing, with straight lines playing across and around curved form.



A side-mounted Fox 78 gives plenty of power for the NSPA aerobatic sequence. The engine is well-disguised in the cavernous cowl.

N.Y. When I visited Mr. Levenson, I found that he had enhanced its beauty by re-upholstering the interior, adding Navy squadron insignias to the fin, and chrome-plating the spinner. Jim Frankenfield's N112JF is currently based at Executive Airport in Ft. Lauderdale, Fla.

Of course, there are many other examples of the Senior Aero Sport across the U.S.—I even heard of a Navy lieutenant who was building one aboard the USS Roosevelt! I'm sure that a letter to any owner would bring mounds of photographs and other scale data for your modeling project. And, a letter to Nicholas D'Apuzzo, 1029 Blue Rock Lane, Blue Bell, Pa., (with a check for $3.00) will get you a set of three-views, with photographs and a list of all completed Senior Aero Sports.

In addition to these sources, the following periodicals contain certain information on the Senior Aero Sport: *Sport Flying*, Feburary and August, 1970; *Flight Digest*, fall 1969; *Sport Aviation*, March, 1961 (this article covers the PJ-260, single-place version, forerunner of the Senior Aero Sport), and November, 1968 (cover photo of N112JF). If you have any trouble obtaining scale documentation, please send me a letter in care of **AAM**, and I might be able to help.

CONSTRUCTION

Construction of the model can begin with any of the major components: wings, fuselage, or tail surfaces. I'll describe wing construction first, as it represents the major time investment.

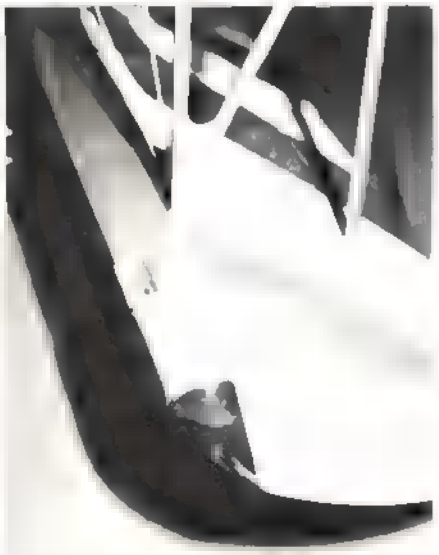
(Continued on page 85)

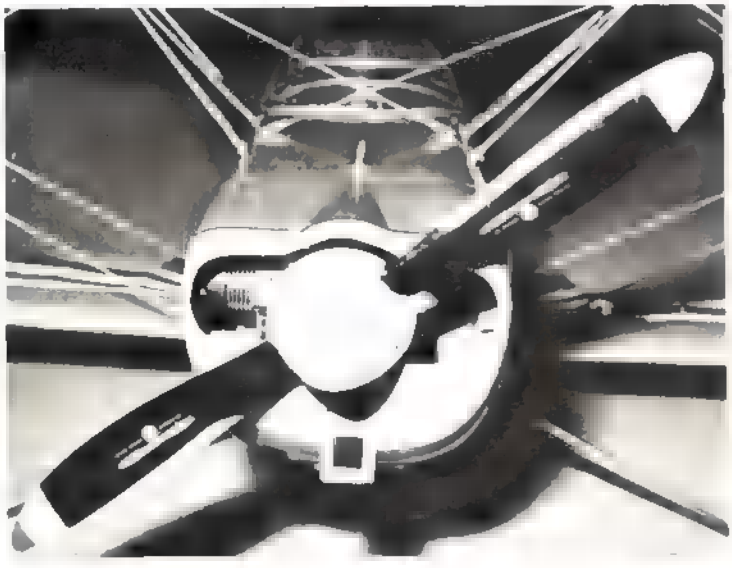
Being a homebuilt project, the Aero Sport—seen from two angles here—has plenty of scale documentation readily available. The full-size plane won the EAA's Grand Champion Homebuilt Award.

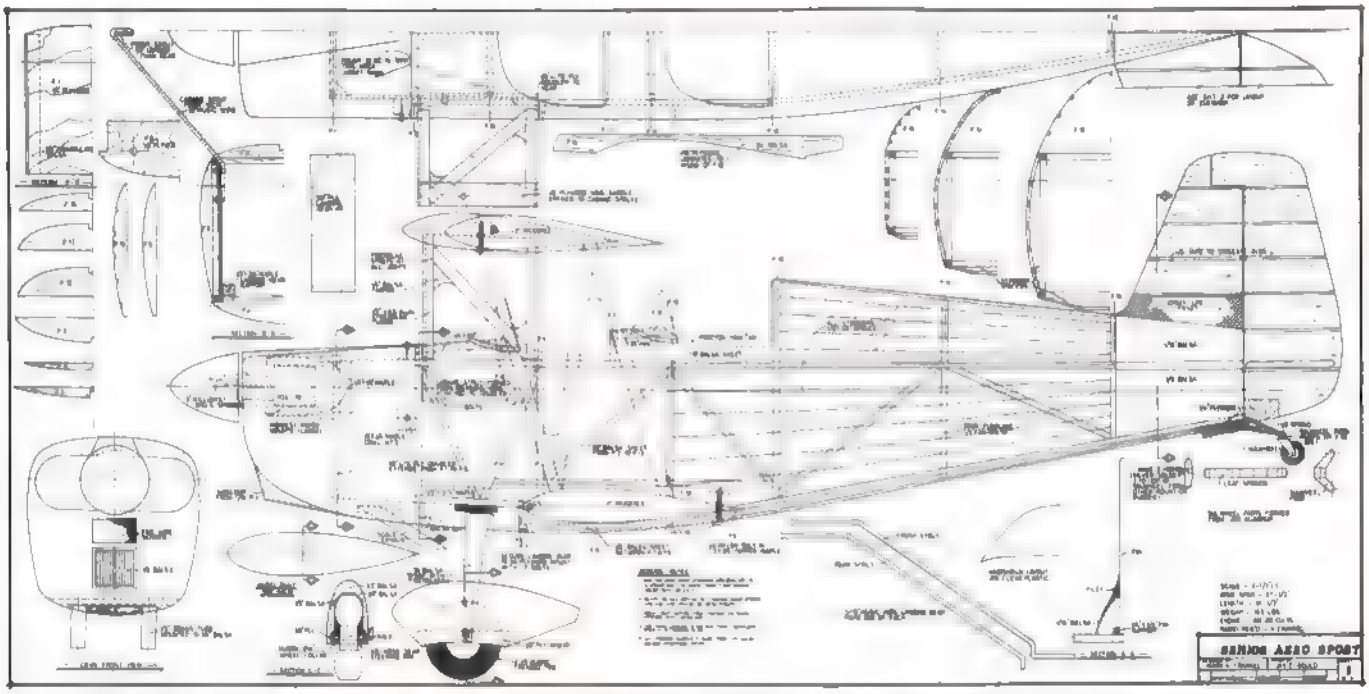
Checkerboard underpainting adds to design's racy appearance.

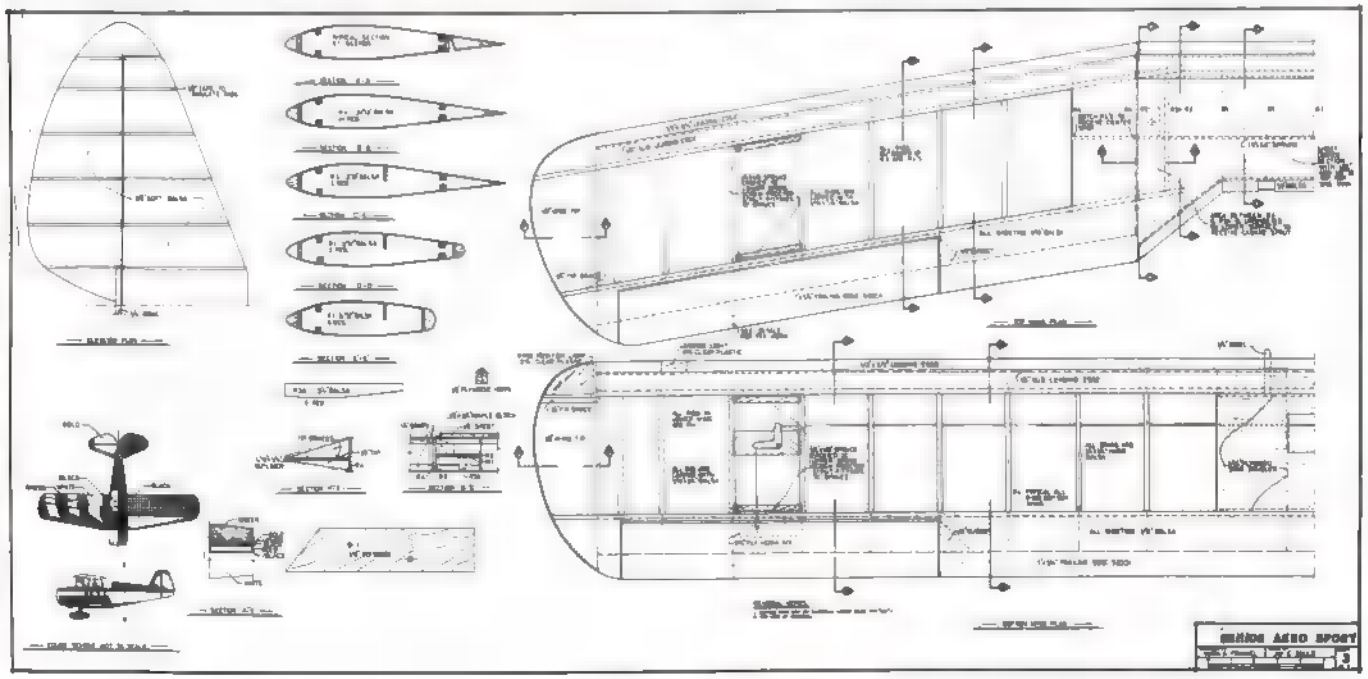
Detailed cockpits aren't very difficult on a model this size. They add that final touch to any project.

DETAILS,
DETAILS,
DETAILS,
DETAILS









FULL-SIZE PLANS AVAILABLE—SEE PAGE 83

The MonoKote Squadron

No plane goes through more grueling workouts and trials than the ones that belong to the AMA Show Team.

These modelers are hard-driving experts and their planes are the Superstars of the flying world. They get put through countless public shows, often performing acrobatics and stunts that real aircraft couldn't begin to do. And, of course, they have to be kept in prime condition and appearance.

So, when we found out that the AMA team members individually chose SUPER MONOKOTE for their models, without any form of solicitation, we were a little flattered . . . But, we weren't surprised.

Because, for years, we've been telling modelers that SUPER MONOKOTE was the truly professional finish and this just proves our point.

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So, if you'd like to give a professional finish to your model, join the professionals of the AMA Show Team . . . SUPER MONOKOTE *YOUR* next plane.

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What every modeler needs when he's covering a model . . .

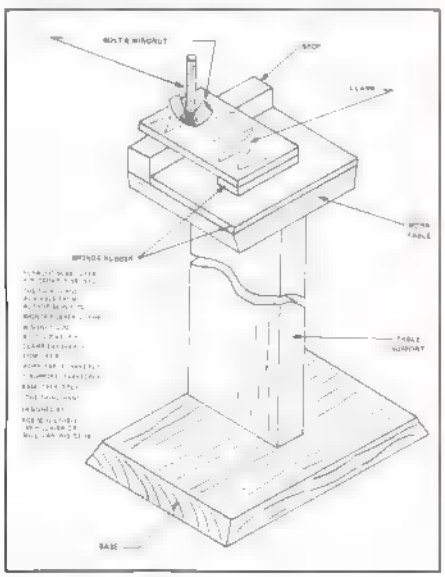
The Third Hand

by Robert Schultheis

If you've ever ironed on the mylar covering materials, you've probably wished you had one more arm. . .or at least another foot or a longer nose. I guess the name for this gadget grew out of the need for a "third hand." This little device can make life happier when covering those small airplane parts like ailerons, rudders, elevators or flaps. Just clamp 'em in lightly and away you go. Turn 'em, twist 'em, or pull 'em, the small parts stay put while you tighten the material and iron away, sealing all the edges.

I start out by laying the part to be covered on a piece of covering plastic which has its adhesive side up. I then seal one edge. Pick a straight side for this, usually the hinge line on rudders, elevators and the trailing edges on ailerons or flaps. Now, take the part and gently clamp in the fixture. Start drawing down and tightening the mylar, sealing the edge as you go. I even use the fixture for cutting and trimming the edges. Do both sides, shrinking the covering as you proceed.

I suppose you could make a fixture large enough so that you could walk around it and do whole wings, but that's a future project. Give this "third hand" a try. About the only thing it can't do is sign checks.



ABOVE: The Third Hand makes covering those small parts a snap. Here, a stabilizer is held firmly in place. BELOW: The hand assembly is so simple, anyone wonders why it wasn't thought of sooner.

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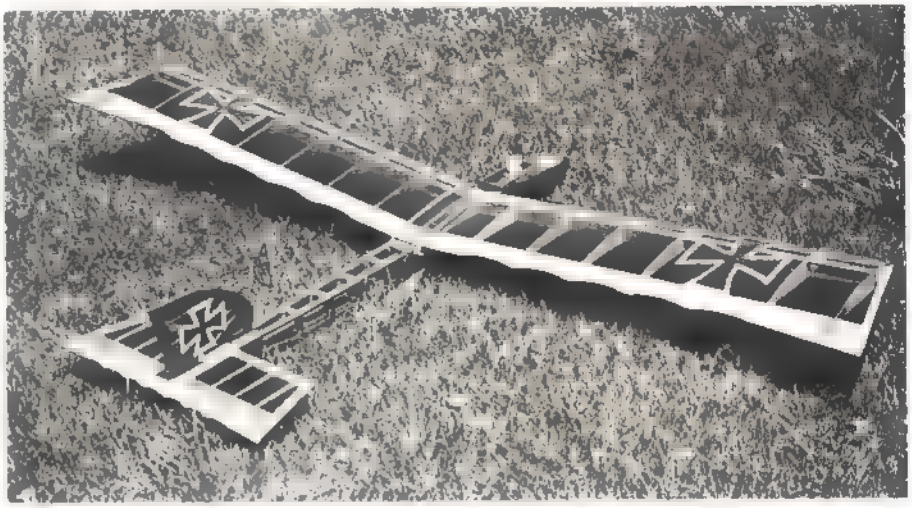
PFALZ ALARM

The time was half-past World War I, and on the Western Front all was quiet (that should make a good book title). At Bar-Le-Moe Aerodrome, the home of Monty Python's dreaded Flying Circus (the Allies' equivalent of Von What's'is-name's merry men), the dew dripped daintily from the deHavilland Dragons as the morning's activities began.

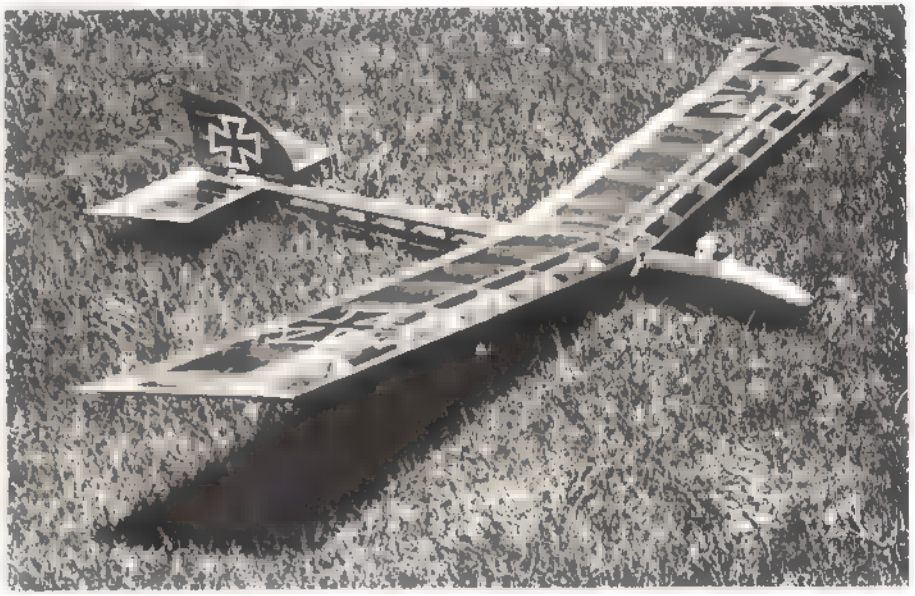
Suddenly, a black shadow appeared on the grassy field and, with a flash of Maltese Crosses, a strange aircraft passed over the sleepy aviators, disappearing into a convenient cloudbank. One of the airmen looked up, then shouted to his friend, "Are the Boche attacking again, Brian?" The other casually replied, "No, old boy, it's just a Pfalz Alarm."

This little fable serves to introduce our non-scale WWI glider—a remarkable subject, as there weren't any gliders in World War I. However, it may not come as any surprise to confess that the Pfalz Alarm is based on the Ugly Stik. But, like most of my designs, I sometimes go off base. In fact, I could probably start, with all good intentions, to produce a model of the Bede 5, and end up with something looking like a Junkers JU-87. But, back to the model of the moment.

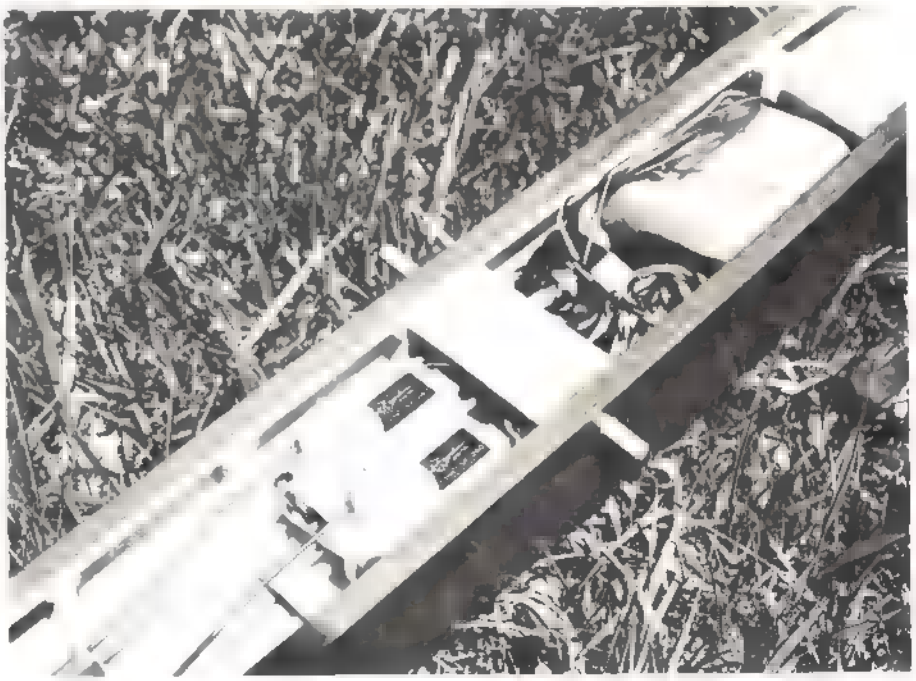
It's a refreshing change from all the slick, high aspect ratio devices I see flying around my local hill; it's easy to build, and flies just as well as the aforementioned models; so why not have a go? For all of you who've been waiting patiently with balsa knife in hand, here are the building instructions.



It's not a sailplane made from an Ugly Stik wing, but the same idea: a mock "WWI-ish" design.



Sport gliding, not competition, is the theme. After all, there are Sunday Sailplaners, too!



Buffalo the radio manufacturers! Servo tape is fine for sailplane installations, but pad the receiver and battery pack against the shock of those abrupt meetings with terra firma.

CONSTRUCTION

Fuselage: Begin the fuselage by constructing the basic box from good quality, 1/4" sq. balsa strips. The fuselage sides are first, and here two points should be noted: first, the upper longeron is stepped down at the rear to make a platform for the tailplane, and second, the lower longeron is spliced at the rear, not bent, for the correct rear fuselage taper.

When two identical sides have been made, join them together with the various frames and, also, 1/4" sq. spacers. After sanding off the gluey bits, pin this box down onto the plan (bottom up) and install the plywood servo mount, which sits on a framework of 1/8 x 1/4" strips. (Note: If you are using small servos, then the framework can be omitted.) Next, add all the F5 and F5A

frames, followed by the 1/4 x 1/2" keel pieces. Aft of frame F3, 1/4" sq. strips can be used to brace the keel. When dry, remove from the building board, sand all over, then add the 1/16" sheeting from F1 to F3 on the fuselage sides and bottom. Balsa blocks at the nose are next, then lots and lots of sanding will complete the body.

Wings: The plans show the right wing drawn out completely, so let's begin by building this wing. Pin the lower main spar and the 1 x 1/4" trailing edge (not yet scalloped) down onto the plan. Note that a small, spliced addition is needed if standard 36" stock is being used. Cut out all the R2 ribs, cement into place, then make and add the wing joiner. Now, cement the upper main spar onto the ribs and wing joiner, add the 3/16" sq. spar, and the 3/8" sq. leading edge. Make and cement into place the R1 ribs, and add the 1/16" webs between the spars (note that the grain direction is vertical).

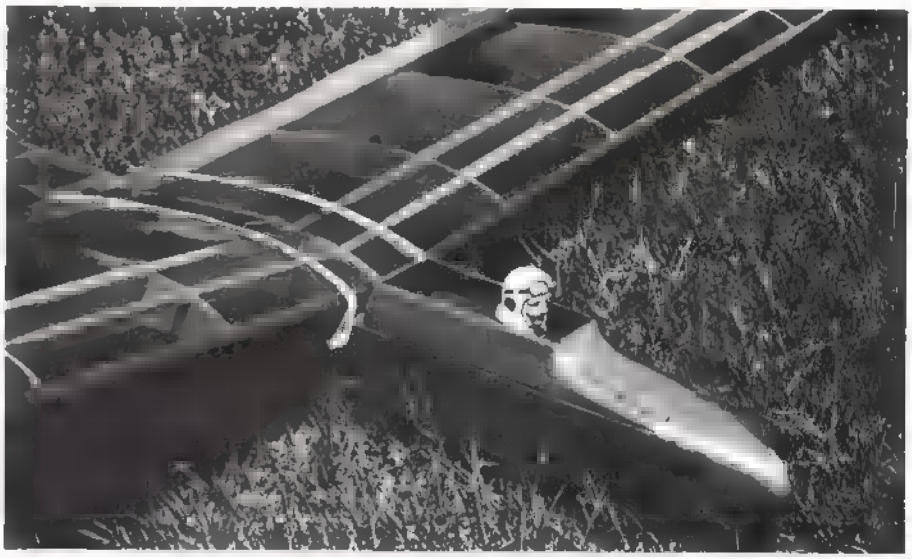
The 1/2 x 1/4" wing tip piece comes now, followed by the 2 ■ 3/32" upper trailing edge sheeting. After adding the various gussets, the trailing edge scallops can be cut. This completes the right wing.

Now for the other wing—this also can be built directly on the plan. Don't forget, though, to put the wing tip on the other end (the dashed lines on the plan show the left tip position).

Build up the left wing ■ previously described until you get to the addition of the upper wing spar, then stop. This is the time to join the two wing panels together. Cement the wing joiner to the lower main spar, propping up only the right panel 8" at the tip to get the correct dihedral. Now, add the upper main spar, then complete the left panel, following the ■■■ instructions as for the right panel.

Sand and cover.

Radio hatch cockpit cover: A removable hatch covers the nose section of the fuselage, and allows access to the battery and receiver. To make this item, first cut out the 3/16" sheet floor to the same outline ■ the body, then cement a balsa block to the forward section. The frame F2A is next glued into place, then the 3/32" sheet sides. A small scrap of celluloid is then added to represent a windshield. Cover, paint, then add pilot(s) and decoration as required.



The little touches give distinction to the Pfalz Alarm. Don't forget pilot and iron crosses.

Fin, Rudder and Tailplane: All of these items ■■ built similarly, so rather than go through the same instructions three times, a few words about the general building ideas should be sufficient.

Begin by making the outside framework from good quality 3/16" sheet, then cement together and pin down to the plan. The various 3/16 ■ 1/4" crosspieces ■■ cut now, and glued into place. If you want to add ■ small ply doubler at the control horn location, then now's the time to do it (1/32" ply should be satisfactory).

After removing the structure from the plan, sand the outline to the final shape, then round off all edges, and put aside until covering time.

An elevator is also required, and this is cut from 3/16" sheet, too. A slight taper is required (as shown on the plan) and this can easily be done with sandpaper.

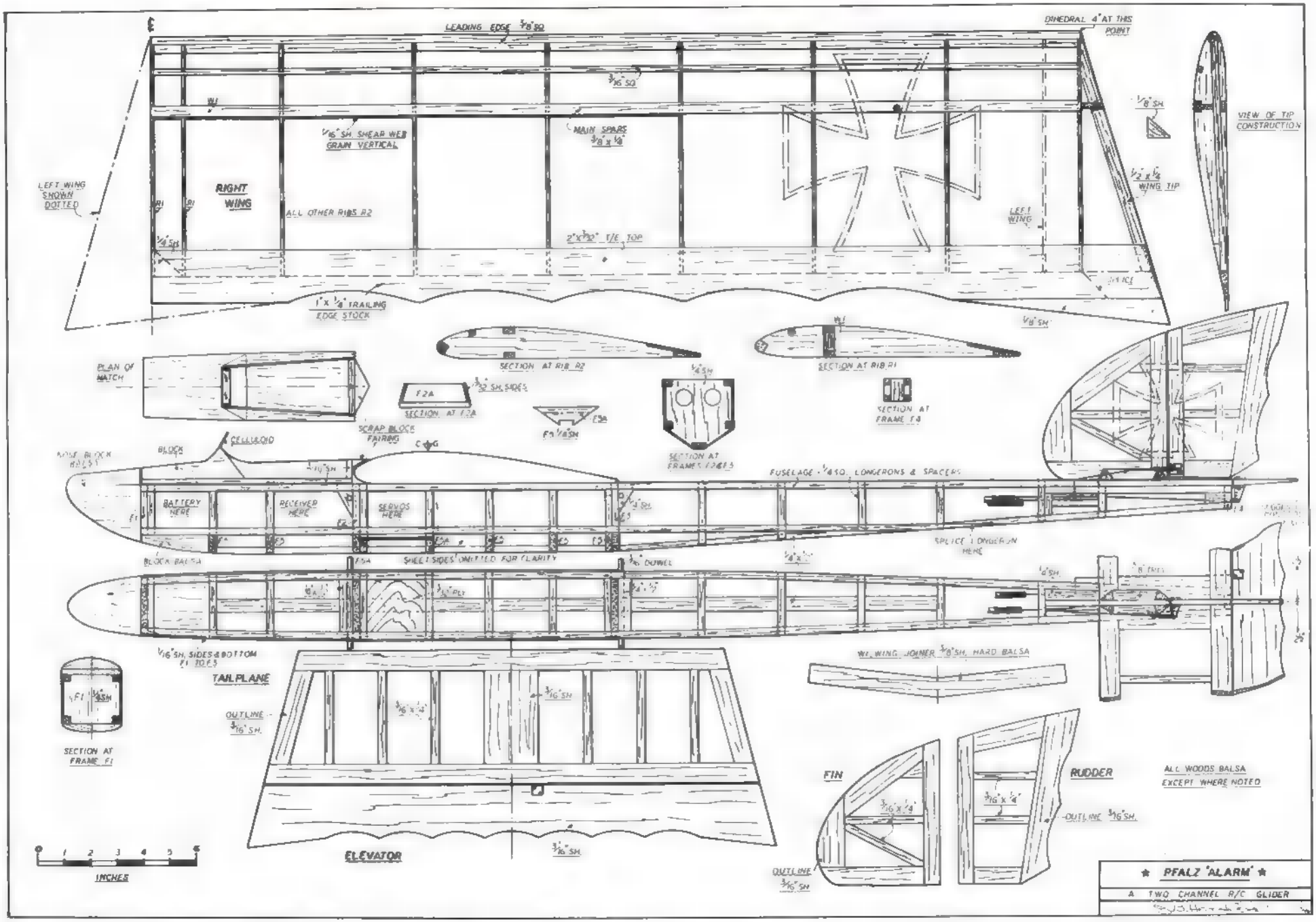
The tailplane is cemented directly to the fuselage, then the fin is glued to the tailplane. Note the use of 3/8" triangular gussets to help reinforce this joint.

Covering: The prototype was covered in transparent red (Solarfilm in this case), but any color or make of mylar material will do. The insignia was also cut from Solarfilm, and ironed into place. To make these, first cut out ■ white cross to the outer shape given on the plan, and a black cross to the inner shape. Using solvent, attach the white cross to the wing, then iron into place. Now repeat for the black cross.

The control hinges were made from Solarfilm, but commercial hinges can be used just as well.

(Continued ■■ page 92)

The tail feathers continue the scalloped motif of the wing. Mylar hinges are tops for gliders.



FULL-SIZE PLANS AVAILABLE—SEE PAGE 86

Cougar Slope Cat

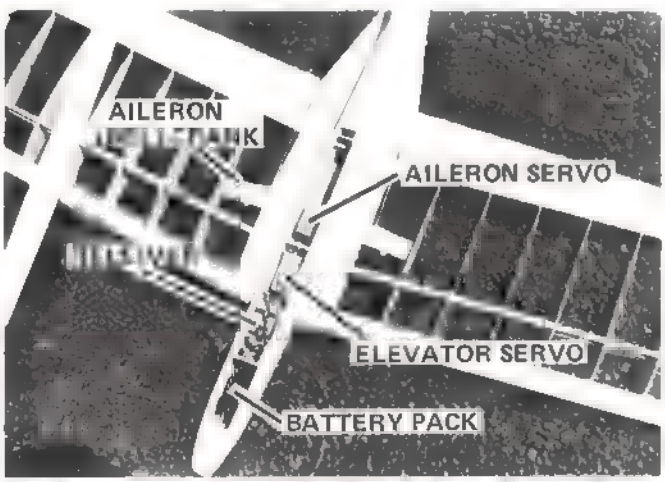
The Cougar Cat fills the bill for ■ new thrill on the hill./by Larry Fogel

The Cougar Slope Cat was conceived, designed and constructed by Paul Denson of the Torrey Pines Gulls, on the basis of the Midwest Super Combat Streak Control Line kit N-5. The original has a 42" wingspan and 29" long fuselage. The fuselage ▬ extended to 32" and the wings swept back, thus the unique curved ribs. Triangular wing trailers were added to give it the "Cougar look."

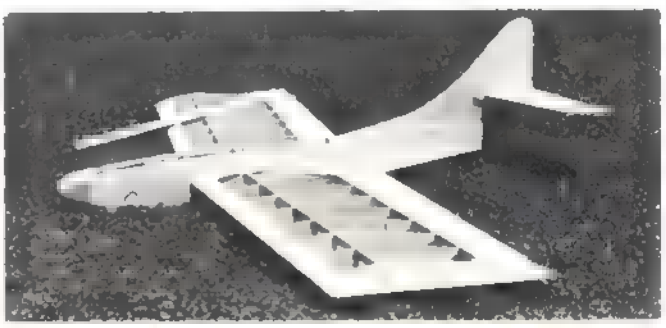
The aileron servo is mounted inverted between the wings. The elevator servo is forward of that position. The receiver and small-size battery pack are in the nose. No weight is required to balance this 23 oz. slope soarer. MonoKote is dark blue, while chrome underside and trim complete the picture.

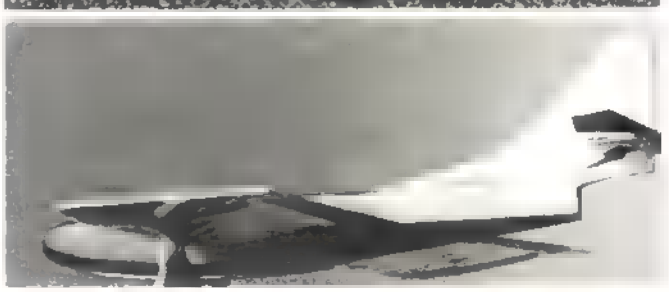
Talk about excitement, here is ■ fast-reacting beauty. She flies equally well inverted. It turns on ■ dime (with inflation what it is, would you believe ■ nickel?). Landing is ■ special event. I suggest ■ long first flight to get a solid feel for the handling quality before the final approach.

Here is an inexpensive project for those who face ■ challenging slope. (Readers may wish to refer to Paul's Tony article, which appeared in the January, 1975, AAM.)



The Cougar is a converted Top Flite CL Super Combat Streak. It really streaks on the slopes. All the kit mods are obvious in the photos. A typical installation, as seen above, mounts the aileron servo inverted. As the name implies, the Cougar is a diminutive cat, with agility and extreme quickness.





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DV 60-CF
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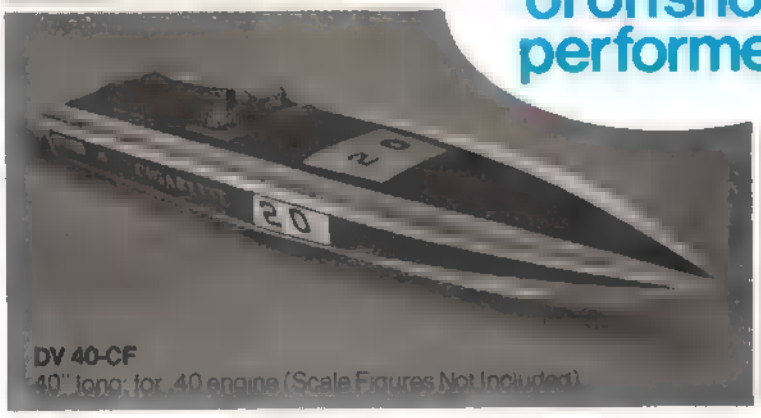
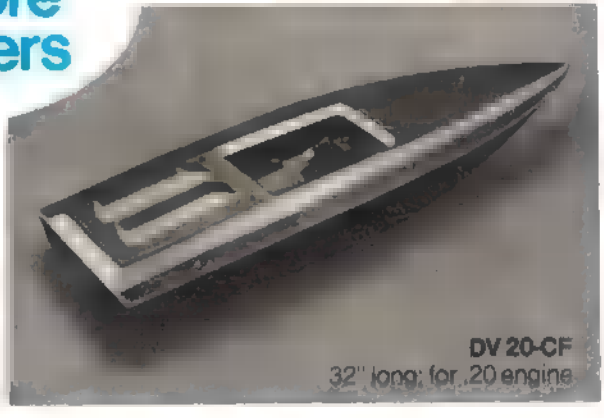
A trio of offshore performers



DV 40-CF
40" long; for .40 engine (Scale Figures Not Included)



DV 20-CF
32" long; for .20 engine

Focusing on R/C Deep Vee Offshore Racing, the fastest growing model boating event in the country, Dumas has engineered ■ new competition series of Deep Vee kits fashioned after the famous 36' full scale Cigarette hulls. These new models are a strong addition to the standard Dumas Deep Vee kits which have captured the majority of wins during the past racing season.

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When competing in offshore type races, Dumas kits give you running ability with minimum flips, eliminate frustrating drownouts . . . and above all, give you maximum assurance that you'll finish the heat . . . topside up.

Now you don't need special engines or years of experience to be a competitive "pro".

All kits are easily built, and boast fiberglass construction with hull and deck finished and ready for joining. Complete adjustable parallel drive running hardware kits are available.

Ask your dealer to show you this new competition series, and remember to ask for the Dumas Deep Vee Running Hardware Set . . . and see if you don't feel the competitive spirit.

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dumas boats

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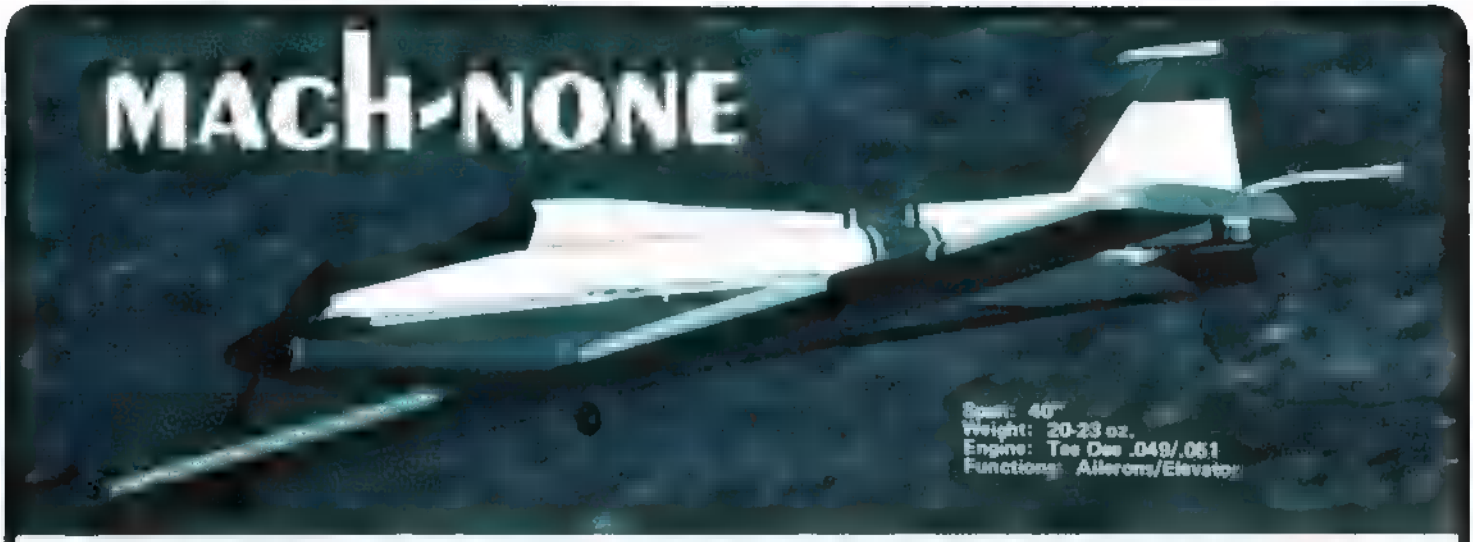
MACH-NONE



With immediate, worldwide acceptance, the Ace Pacer revolutionized small plane concepts by opening a whole new category of R/C model aircraft: the high performance 1/2A pattern ship.

Now Ace R/C proudly announces the second kit in this exciting new category of R/C planes, the Mach None. It has the same outstanding features as the Pacer: it's fast building and economical on fuel, is easily transportable, and needs a minimum of flying field area. Yet, its performance needs to be experienced to be believed.

Has fully formed parts with molded canopy and foam wing. Is for at least two channel radios with small servos. Not for beginners.

13L108 Mach None Kit $19.95

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YOU DON'T HAVE TO SACRIFICE PERFORMANCE FOR ECONOMY.

Designed by Owen Kampen

UPSTART II

Although initially conceived and developed a few years ago, the concept of 1/2A racing is mushrooming because of the increasing fuel costs and the ever increasing need for expert skills in the quarter midget class. This new improved version of the popular Upstart is a step further toward perfection in 1/2A racing.

Through the data learned in the development of the Whizard and the Pacer, the Upstart II is set up for aileron and elevator control for tighter, groovier pylon turns and more consistent straight out flight. Recommended engine is the Cox .049/.051.

As with any high performance airplane, it is not recommended for beginners.

13L102 Upstart II Kit $17.95

SPAN: 32 in.
AREA: 200 sq. in.
LENGTH: 28 1/2 in.
POWER: Tee Dee [illegible]
FUNCTIONS: Ailerons - Elevator

ACE R/C INC.

DIGITAL COMMANDER KITS

THE CONCEPT OF the Digital Commander series of kits designed by Fred Marks is to offer expansion or replacement within your existing system--no matter what brand or how many channels. You no longer have to pay unreasonably high prices for [redacted] additional receiver, servo, or flite pack.

1-8 RECEIVER

This receiver features voltage regulated circuitry with AGC and double tuned front end. An 8 bit shift register in the IC decoder offers up to eight channel operation of positive or negative pulse servos with three or four wires.

Case measures 1 1/8 X 1 1/2 X 1 7/8 in. Weight is 1.4 oz. Connectors are not furnished. Available on all 27, 53, and 72 mHz frequencies.

1-8 FLITE PAK

The Flite Pak kits come with a 1-8 receiver, the number and style of servos specified, plus the switch and Dean's connectors necessary to make a complete flite pack less batteries. Available on all 27, 53 and 72 mHz frequencies. Please specify.

SERVO

An IC [redacted]vo amplifier and the popular D & R servo mechanics combine to make a servo that gives superior resolution and rapid transit time. Will operate with [redacted] or [redacted] wire IC decoders with positive pulse output.

Available in Bantam (rotary output-1 1/2 X 1 7/16 X 3/4 in.); Linear (linear or rotary output-1 13/16 X 1 7/16 X 7/8 in.); or Retract (Goldberg mechanics-180° travel). Available assembled for an additional $8.00.

A conversion kit is available to increase the Bantam's power by .8 lb. which subsequently increases transit time by about .1 second.

AVAILABLE ON ALL 27, 53, and 72 [redacted] FREQUENCIES

PRICES

FLITE PAK KITS	
12G18-2 Flite Pak w/2 Bantams	$79.95
12G18-4 Flite Pak w/4 Bantams	124.95
12G18-2L Flite Pak w/2 Linears	81.95
12G18-4L Flite Pak w/4 Linears	126.95
1-8 RECEIVER	
12G18 1-8 Receiver Kit	$37.95
Add $5.00 for receivers and flite paks on 72 mHz	
SERVOS	
14G20 Bantam Servo Kit	$23.95
14K89 High Power Bantam Conv. Kit	1.00
14G20L Linear Servo Kit	24.95
14G24 Retract Servo Kit	24.95
14G25 Servo Electronics Only	10.75
Add $8.00 for assembled servos.	

NEW!

Dual Rack Servo

Here's [redacted] addition [redacted] the Digital Commander line that's [redacted] to be popular. It offers [redacted] primary advantage not [redacted] before in this miniature size--linear and rotary output!

Although the Dual Rack [redacted] is only slightly larger than the Bantam, it still has enough strength and power for the .60 powered ships. [redacted] offering [redacted] separate kit and [redacted] servo option in the Flite Pak kits. It will work with any positive pulse system--three or four wire.

Measures 3/4" X 1 1/2" X 1 9/16", excluding lugs and outputs; power = 3.8 lbs.; transit time = approx. .6 sec. for 90°.

This is the miniature servo that you've been looking for!

14G20D—Dual Rack Servo Kit	[redacted]
12G18-2D—Flite Pak w/2 Dual Rack Servos	81.95
12G18-4D—Flite Pak w/4 Dual Rack Servos	128.95

Add $5.00 for Flite Paks on 72 MHZ.

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ACE R/C INC.

Sailplane Aero-Tow

Emulate the big boys with a tow to altitude behind a powered job./by Gordon Pearson

What do you do when you, a sailplane pilot, have a gallon of fuel and an 88" Buzzard Bombshell-type Model? Being a person who likes to experiment and attempt the seemingly more difficult (and not wanting to waste a gallon of fuel), I decided to press the Bombshell into service in an unusual way. I would combine my first love (sailplanes) with power—a tow plane for sailplanes.

I read somewhere that towing sailplanes was difficult. I think the same person said the bumblebee cannot fly. That statement may not be fair. We may just be lucky. At any rate, towing is a means of getting a glider to a good altitude is not difficult, providing you have: (a) a good tow plane (slow and stable); (b) a reliable engine (40 cu. in. displacement or larger); (c) a good set of running legs; (d) any sailplane with a towhook near the nose.

Let's divide the project into three categories. (1) The tow plane, (2) the glider and it's tow release mechanism, and (3) the method of launch and release of airborne.

The tow plane: I used an 88" sorta Buzzard Bombshell, powered with a Veco 45, swinging a 13½ x 5 prop. The placement of the towline is immediately behind the trailing edge of the wing. I did not experiment in other positions, as this position worked out perfectly. There is no need to employ any kind of yoke to keep the towline from the rudder and stab, as the glider flies above the tow plane. A simple snap swivel and about 50 ft. of 60 lb. test, monofilament fishing line is used. At the glider end of the line, a 18" piece of 1/8" surgical tubing, with a 12" fishing leader and key chain ring, make up the entire package.

Placement of towhook on the glider should be as close to the nose as possible. We have found that a simple hook works fine. See drawings for some mechanical tow releases we have used.

The author ROGs the powered tow plane, while the sailplane pilot synchronizes his launch. Timing is the trick.

The drawings on the following page suggest a few of the possible ways to set up the line release. Let the airframe and radio installation be your guide. The external block method is easiest.

Method of launch: The tow plane should be revved up to top rpm, then released (ROG is a must). This is where we have experimented in launching methods. We found that someone with good legs (not necessarily the Brigitte Bardot type) holds the sailplane above his head, and runs to keep up with the powered plane as it takes off.

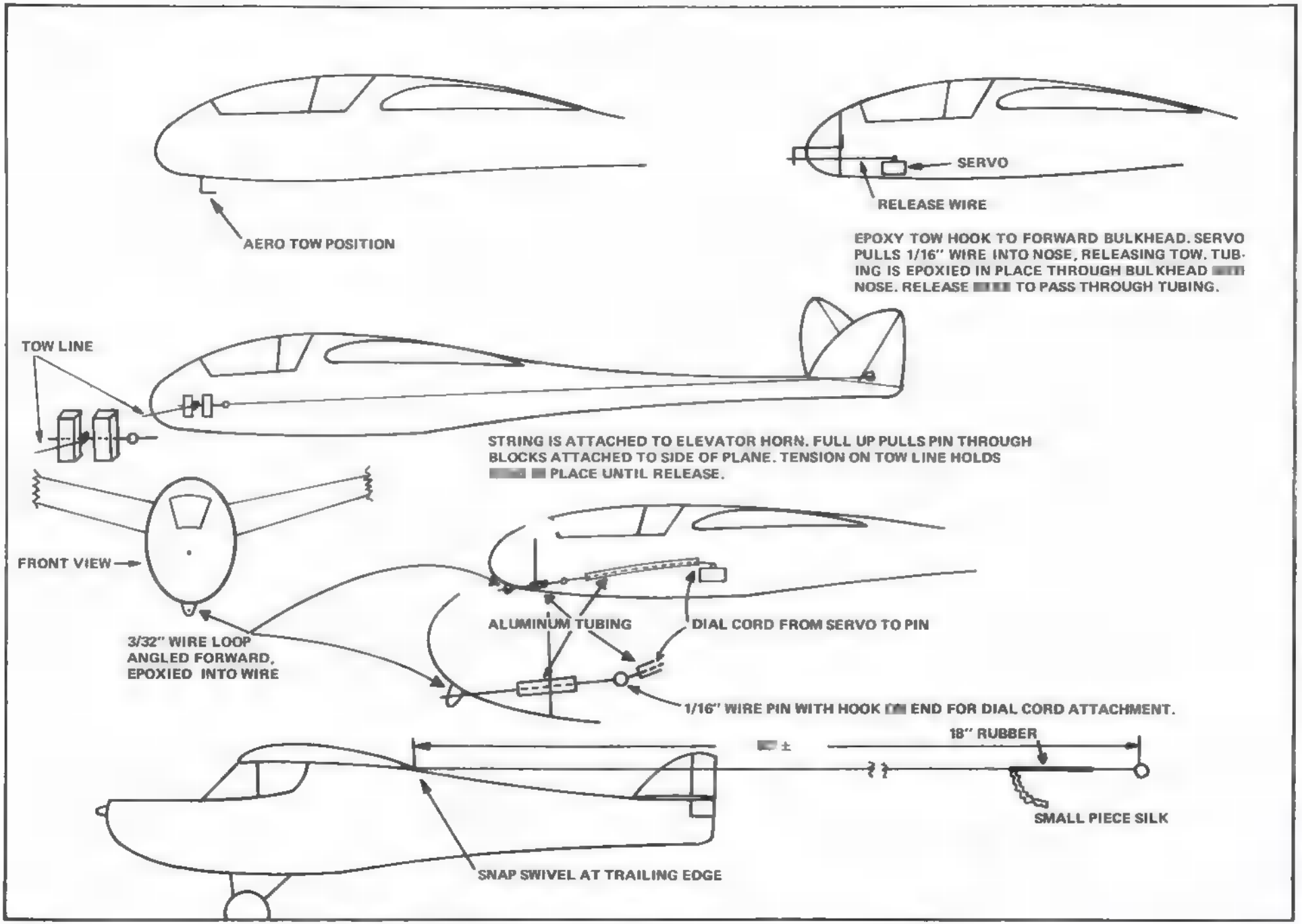
The glider will be airborne before the powered plane, and it is during this transition that problems, if any, may occur. If the line becomes slack, the glider is flying faster than the tow plane and the line may [illegible] off the glider. To eliminate this problem, a positive tow release would be helpful. When the power plane reaches the speed of the glider the rubber in the towline helps reduce the jerk (not the pilot) on the glider and tow plane. Try to keep the glider above the tow plane and keep the turns fairly large.

When the proper altitude is reached, and this is determined by just how high you wish to go and still see what you are doing, you must release. If you have a mechanical release, [illegible] it. If you do not, the tow plane should throttle back and let the glider overfly it.

At this point, if there [illegible] others who want a tow, you spiral down, land, hook up, and go again. If no one is waiting to go up, chop your engine and see if you can stay up [illegible] long as the sailplane. I towed [illegible] Cirrus up that got a 15 min. flight. . .the Buzzard came down 15 min. after the Cirrus. Overheard the pilot of the glider say, "That is disgusting."

In conclusion, the tow plane must be slow, stable, and have enough power to pull up [illegible] 4 lb. plane—minimum .40 cu. in. It is best to have a positive release towhook. With any kind of luck, the glider guys will pay for your fuel. One word of caution. When the tow plane is landing, be careful of the towline. It might smart if you got hit by the tow ring at 20 mph.

Barry Killick displays the automatic tow release in his Windsong.


AERO TOW POSITION
SERVO
RELEASE WIRE
EPOXY TOW HOOK TO FORWARD BULKHEAD. SERVO PULLS 1/16" WIRE INTO NOSE, RELEASING TOW. TUBING IS EPOXIED IN PLACE THROUGH BULKHEAD [redacted] NOSE. RELEASE [redacted] TO PASS THROUGH TUBING.
TOW LINE
STRING IS ATTACHED TO ELEVATOR HORN. FULL UP PULLS PIN THROUGH BLOCKS ATTACHED TO SIDE OF PLANE. TENSION ON TOW LINE HOLDS [redacted] PLACE UNTIL RELEASE.
FRONT VIEW
3/32" WIRE LOOP ANGLED FORWARD, EPOXIED INTO WIRE
ALUMINUM TUBING
DIAL CORD FROM SERVO TO PIN
1/16" WIRE PIN WITH HOOK [redacted] END FOR DIAL CORD ATTACHMENT.
18" RUBBER
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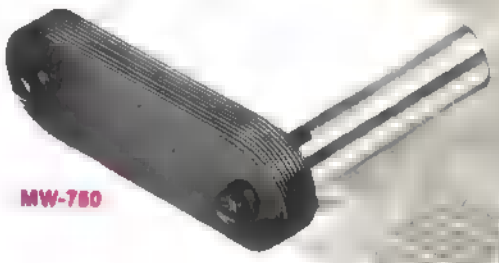

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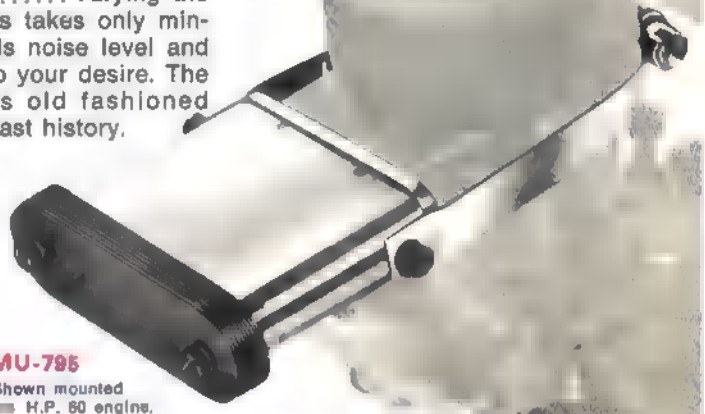

MU-795
Shown mounted on H.P. 60 engine.

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OWNERS OF SUPER TIGRE .60BLUE HEAD ENGINES WILL FIND THIS ATTACHING KIT THE IDEAL WAY TO INSTALL THE DU-BRO MU-795 MUFF'L'AIRE . . . COMPLETE KIT WITH INSTRUCTIONS

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HAWAIIAN HOLIDAY

A meeting of modelers can mean more than the roar of engines and a sky filled with planes. /by Dan Gutridge

Leaving the sunny shores of California for the Big Island of Hawaii, the B.I.R.D.s (Carson, Calif.) began their migration for the Third Annual Vacation Contest. Although greeted by strangers, the "Hilo guys" made our welcome look like a reunion of lifelong friends.

Like a young girl's first love, the enchantment of the Hawaiian people swept everyone off their feet. Although not participating in the contest themselves, the "Hilo guys" (Clayton Gomes, Gilbert Bugado, Terrence Machado and Aliki Harris) took everyone into their hearts during the two short days on the Hilo side of the island. Within 24 hours the group was being chauffeured around the island on a tour unlike any that could be planned professionally. This was personal. A visit to their local flying

LEFT: [illegible] King declines Hiroshi Kodayashi's offer to repair his Toad. "It only needs a small piece." RIGHT: Lava rock hath [illegible] mercy.

A serene Hawaiian sunset was the crowning glory of the awards banquet, as seen in photo ■ top of page 38. ABOVE: The B.I.R.D.s crowd aboard ■ catamaran for a leisurely dinner.

field included use of their planes for a little fun in the sky—and they even packed homemade lunches for everyone.

What did they say when ■■ departed for the contest site in Kona? "We would like to apologize for not arranging more for you here. We did not dream that you would be so friendly to us and actually accept us as your friends. We have really done nothing here; all we really want is to be remembered."

Remembered indeed! These people are really fantastic. Most of the local legwork for the contest and other activities in Kona was handled commendably by Mike Miranda, president of the Kona Flyers. We were also met in Kona by our friends from Honolulu, who did all the organizing and handled the details of the contest: Ben King, Bob Barnes and Bill Fuchberger. All of these people did ■ terrific job providing us with aobut 1500 ft. of paved runway, and ■ site which was completely without the notorious Hawaiian winds ■■ previously encountered in Honolulu.

Pattern was flown Wednesday and Thrusday, followed by 500 Class Pylon on Friday. All events began at 9:00 a.m. "Hawaiian Time" (that is, sometime after the time specified—atmosphere very relaxed), and everyone got in lots of flying.

As everyone in attendance will surely testify, we all became acquainted with the 1926 lava flow which covers the Island of Hawaii. There were a few unfortunate crashes, and it was discovered that the lava-covered ground had absolutely no give when met by a model aircraft. After making that discovery once during the Pattern event, club President Joe Zingali decided that it was too rough for him. He then proceeded to crash two Quicky 500 racers into the ocean, instead.

Some of the other activities arranged for us included a real Hawaiian beach party at ■ private beach house, many after-hours gatherings, and ■ delightful dinner cruise on a huge catamaran. As ■ fitting climax, the awards banquet was held in a great, open bamboo hut on a sandy beach. Hand-carved Hawaiian trophies are now treasured by the winners. Our banquet was blessed with a fantastic, multi-colored sunset over the blue Pacific. . .a truly beautiful ending to an equally beautiful experience.

June 28-July 6, 1975, marks the date for the next B.I.R.D. Vacation Contest, but with a new destination. We are inviting you to spend your vacation with us in the B.I.R.D. city of Carson, Calif. We will prepare caravan tours to Disneyland, Sea World, and ■ host of other exciting attractions which have appeal for the whole family. Just let us know who and where you are now and we will get the information to you. The Hawaiians already have said they will come, and I hope that you will join us, too.

Don't forget, this is a vacation contest created strictly for the Sunday Flier, ■■ well as the expert who wants to fly in ■ relaxed atmosphere. The contest again will be held on "Hawaiian Time," and we would hope you start planning now to return with us to Kona in the summer of '76.

LEFT: Anyone for half a prop? The Hilo guys loaned the B.I.R.D.s planes to fly. RIGHT: Chuck Watkins is indoctrinated ■■ ■ Quicky 500.

getting started in R/C

by Jim McNerney

What is a Good Radio? PART II

In our first article (January, 1975, AAM) we discussed evaluation of the mechanical and visual aspects of a radio control system. Essentially, we determined physical characteristics that are normally considered desirable. Those are the things you can see and feel, which don't take any special tools or smarts to find. This month we get into some of the less obvious things that determine the usefulness and desirability of a radio system. These are the things for which you normally have to take somebody else's word.

First, the average RCer couldn't care less about how many microvolts of sensitivity are claimed for a receiver, or whether servo transit time is 0.4 or 0.5 sec. What he really cares about is that, when he moves a control on the transmitter, the model responds the way he expects it to, quickly and accurately. He also expects that, with reasonable care on his part, the radio will be reliable and trouble free.

What we will try to do is explain some of that technical jargon used in manufacturers' specifications and in some test reports in terms of what it means to you, the user. Then, if you wish, you can add those terms to your checklist.

The general headings we'll discuss are:

(1) Range.
(2) Noise resistance.
(3) Stability.
(4) Tracking ability.
(5) Operating time.

Range is defined here as the distance from the transmitter at which you can safely operate the airplane with positive, glitch-free control. We're not really worried about absolute distance, but you should have stable, positive control available farther than you can visually tell what the airplane is doing. In other words, you should run out of eyesight before you run out of control. The things which affect range most are: (1) transmitter output power; (2) receiver sensitivity; and (3) accurate tuning.

Both output power and receiver sensitivity are design characteristics and will vary from one manufacturer to another. The advertised specifications are normally "worst case" values, and individual units might be slightly better than specification—but should never be than specification. The higher the transmitter output, the greater the range. But, for a given battery size, higher power means shorter operating time. The lower the value of receiver sensitivity (all other things being equal) the better the range. That is, one microvolt sensitivity is better than three microvolts. Sometimes it's hard to find out how this sensitivity is measured. There is no standard like there is in measuring hi-fi equipment, for example. Basically, if a receiver has three microvolts sensitivity or better, it's good enough.

It doesn't matter how powerful the transmitter, or how sensitive the receiver, if they are not properly tuned to each other. Lots of things affect the tuning, and we'll talk about some of them later, but tuning is a maintenance or setup function, not a design function. The design of the tuning system does affect our next main topic, *noise resistance.*

The air around us is filled with all kinds of radiation. Any electromagnetic radiation that can be seen by the receiver, but is not from the transmitter, is "noise" to the receiver. This noise is always present. It is worse in some places than others. It also varies with the time of day, season, and location in the 11-year sunspot cycle. The farther the receiver is from the transmitter, the higher the level of the noise, compared with the signal received from the transmitter.

There are other forms of noise present, too. Some is generated within the receiver itself, and some comes from servo motors, or other sources within the airplane. If the noise, by the receiver, is as strong as, or stronger than, the transmitted signal, it will result in random jitter or glitching of the servo outputs, or hard-over commands to the servos.

One way of reducing the effect of noise is to increase the receiver "selectivity," that is, tune the receiver so sharply that only the exact transmitted frequency is allowed to pass through it. This is not practical because there must be sufficient "band-width" to allow the control information carried by the transmitted signal to pass into the decoding section of the receiver. But this "pass band" is rather narrow, so that peak tuning can be done without distorting the control information.

Without getting into superheterodyne principles, let's just say that there are three areas in the receiver where we accomplish this "peaking." These areas correspond to the frequency levels, namely: the radio frequency (RF) section, the intermediate frequency (IF), and the audio frequency (AF) sections. RF is the transmitted frequency. The section of the receiver passing this frequency is called the "front end." You will read or hear the terms, single-tuned, or double-tuned, front end. A double-tuned front end will have more selectivity, hence better noise rejection, than a single-tuned front end. Radio specifications also will normally state the number of stages of IF. Ordinarily, the more stages of IF, the greater the selectivity. In this regard, you will see advertisements for "dual conversion" receivers. These receivers have two different levels of IF with multiple stages in each level. They are the quietest and most selective receivers made. They are also more expensive than standard receivers with only one level of IF.

The last stage of AF is the least critical stage. At this point we are not so concerned with maintaining the transmitter wave shape as in preserving the transmitted pulse spacing. So, instead of "tuning" this stage, many manufacturers merely chop off the lower portion of the signal, thus

(Continued on page 101)

Graupner BELL 212 Twin-Jet

Sensational First Crossing of the English Channel and 3 World Records

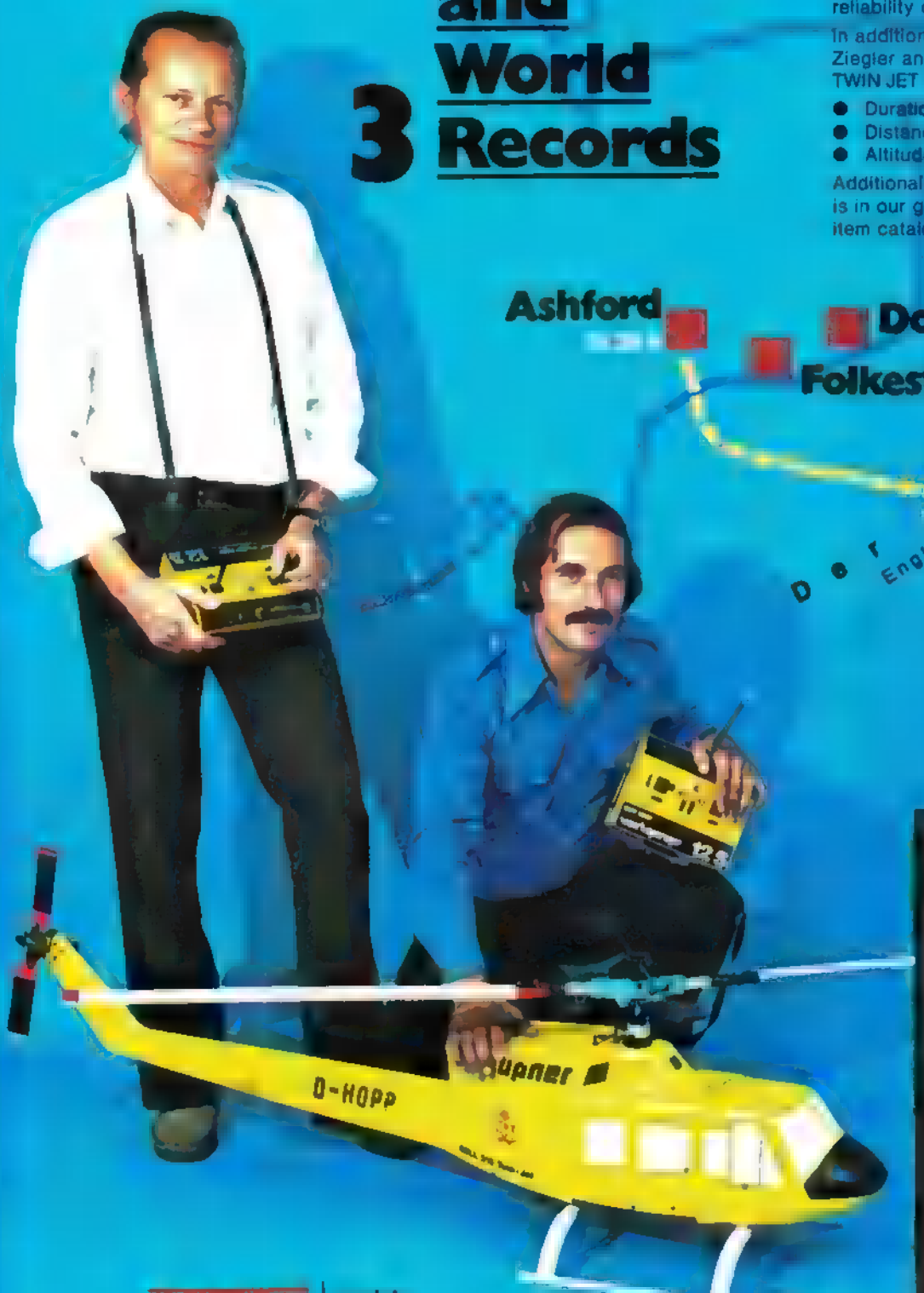
The BELL 212 TWIN JET is the first model helicopter to fly across the English Channel. On July 17, 1974 Dieter Ziegler flew this outstanding record flight with the GRUNDIG VARIO-PROP 12 S radio system.

Not only did the channel crossing set high standards for the pilot, but also for the technical precision for the model, the mechanics, and reliability of the radio.

In addition to the channel crossing, Mr. Dieter Ziegler and Heinz Pällmann with the BELL 212 TWIN JET achieved 3 world helicopter records:

- Duration: 1 h 45 min
- Distance: 57.5 km
- Altitude: 1058 m

Additional information on the BELL 212 TWIN JET is in our general catalogue 27 FS and in the new item catalogue N 74.



The occasion of the channel crossing is noted by the French Custom Officials upon the landing of the model in France in memory of the historical

Graupner models model engines electronics

AHM Associated Hobby Mfrs., Inc.
521 East Cayuga Street
Philadelphia / PA 19120

French Motor Co. Inc
33, Berry Street
San Francisco / Calif. 94107

Midwest Model Supply Co.

Royal Products Corp

AZ 54/E

Stephens Akro

A 1/6-scale CL Stunt version of a full-scale plane that looks more like a model than a model does / by Tom Dixon

Realistic stunt ships turn me on. Unfortunately, there aren't very many full-size aerobatic aircraft which are adaptable to stunt use. Most full-scale competition aircraft in this country are Pitts Specials, which are out as CL stunt machines because they are bipes. The Russian Yak and Czech Zlin are okay. The Swiss Akrostar has a low, flat wing and too short a nose moment for a model, and Lew McFarland already has done the Spinks Akromaster (See November, 1974, **AAM**). That leaves the Stephens Akro, which is one of the hottest designs on the horizon for all-out competition. (See Don Berliner's story in August, 1973, **AAM**)

The Akro is well-suited for modeling. If it is reduced to 1/6 scale, we get a 48" span and 38" length. All that is needed is a slight increase in span, and an increase in tip chord to get adequate wing area. The moments already are close to a standard stunter, and certainly within range of Al Rabe's designs. The stabilizer area is increased slightly, to match the wing.

The airfoil should be thick, with large flaps to carry the anticipated high weight. For convenience, a Chipmunk wing section is used. It is proven and readily available in foam. The only problem left is figuring where to put the leadouts. Dihedral is nil, but the wing is placed high in the fuselage. With the gear and engine hanging below, perhaps the leadouts should compensate for this and be placed at the bottom of the wing, in order to make the model fly level. Let's see, 580" sq. and a lot of drag—it will need at least a 40 and maybe a 46. With a 40, .015 lines can still be used in competition.

This is exactly the "scientific" process used to design the model. How did it work? Well, in two contests so far it has taken a third (Lexington, Ky.) and first (Jacksonville, Fla.), so it is competitive.

Problems? Too little stab area and too much dihedral. It flies with the outboard wing slightly high, and drops the tail "through the corner" in a hard square or triangle. Both these minor problems have been corrected in the plans shown here. My thanks to Larry Lauer for pointing this out to me at Lexington. Also, in the version shown here, the landing gear has been moved

back slightly to make wheel landings easier.

In general, the model has a "soft" feel to the controls, but is responsive and turns tightly. The large flaps and thick tail section contribute to this feel, as does the long tail moment. I find the Akro much easier to correct in a maneuver than other stunters because of the soft feel. It is as if the controls are sort of variable in response—dead around neutral, and highly effective at full throw. Anticipating the need for adjustable controls on the prototype, an external elevator horn was used. As it worked out, no changes were needed from a standard one-to-one setup, with a maximum movement of 30° in each direction. Adjustments in turning inside vs. outside must be made by holding the flaps and bending the elevators up or down.

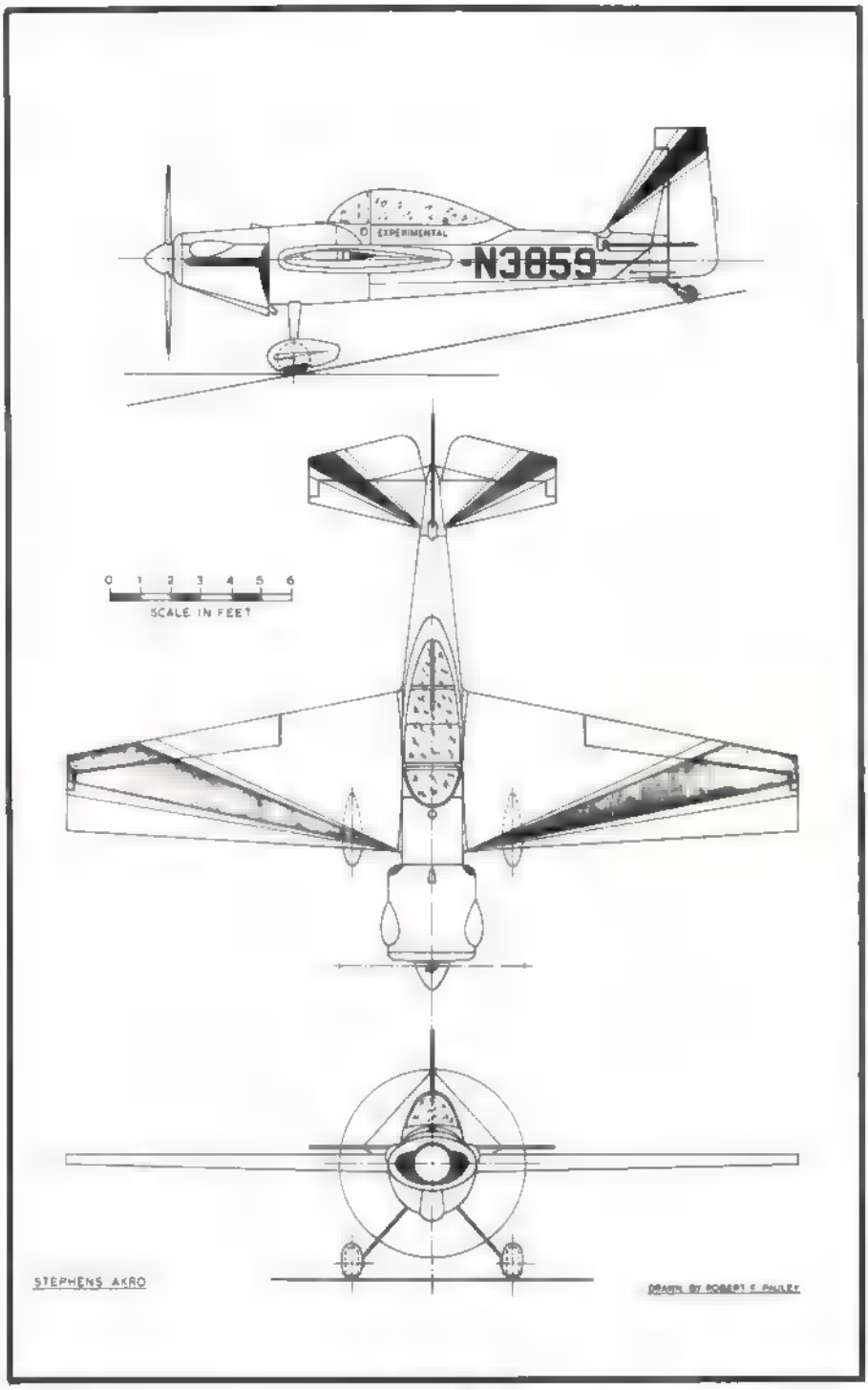
The adjustable rudder deserves some explanation. It is not movable with the elevator, as per Al Rabe's designs. As large as the rudder is on this plane it would be too sensitive, no matter what I had in terms of linkage.

Another problem is the proximity of the elevator and rudder hinge lines. There is no way to hook it up without complicated hardware. Instead, the rudder is ground adjustable. It did turn out to be very sensitive, as predicted. One full turn on the Kwik-link makes a big difference in line tension. If the rudder could be rigged to move only about 1/4" when coupled with the elevator, it might work. Frankly, I don't feel it's worth it, as the model pulls fine, even using a 12 x 6 prop. However, having the rudder adjustable is worth the trouble.

CONSTRUCTION

So much for the design features—on with construction. It is not difficult to build for a scale-type stunter. As with any competition ship, beginning with light wood is important. Keep paint and glue to a minimum. Try to shoot toward a finished weight of about 48-50 oz. for a 40 engine. Heavier than this and a 45-46 will be needed. Also, keep the tail end light. With the long tail moment, the weight and its effect can really build up. Hollow everything from the CG back, keep solder and paint to a minimum, and use very light wood and you'll probably be okay.

ABOVE: Tom Dixon enjoys pretty hot reputation in stunt circles (pun). The Akro has helped him gain all that renown. BELOW: Originally styled after a full-size aerobatic plane (they say that the real one copies its moments and ideas from model aviation!), the Akro now comes full circle (pun again), back to its original intent.



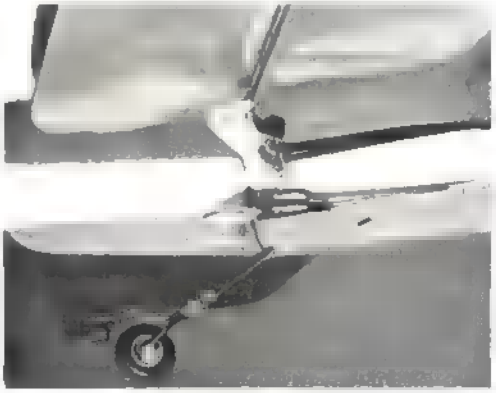
Wing: I use and highly recommend a cored foam wing covered with 1/16" balsa. I've used wings from both Foam-Flite and Control Specialties with good success, and suggest you try either of these companies even if you don't build this model (see plans for addresses). If you insist on a wood wing, follow the sketch shown on the plans or use a modified Chipmunk wing.

Cut ribs using the stack method, and build each wing panel separately, joining in the center only after planking the leading edges of each panel. Note that both panels are of equal length. For either foam or balsa wings, use the over-and-under bellcrank mount, ■ shown. This is built using ■ piece of 8-32 threaded rod, available at most hardware stores. The center joint of the wing is made with epoxy, blocking up the wing tips so that the top surface of the wing is flat from tip to tip. When the center joint is dry, wrap with nylon tape and more epoxy.

Round off the LE to the radius shown. This is important, especially if you build heavy. The more rounded the LE, the less likely the model is to stall in tight turns. The installation of adjustable leadouts and tip weight hatch should be obvious from the plan, but do note where the leadouts ■ positioned in the wing tip. This is essential if the plane is to fly with wings level.

The flaps are light 1/4" sheet attached with your favorite hinges—keep the gap between surfaces to ■ minimum. The control horns are bushed with 1/4" long pieces of brass tubing soldered into the horns. The rod to the outside flap is bound to the inside rod with copper wire, and carefully soldered with acid core solder. Clean the solder joint with

(Continued on page 101)



LEFT: All stunt fliers are wise to the advantages of ■ commercial foam core. They ■ together fast and don't warp. CENTER: The Max ■ and Du-Bro muffler got there mysteriously—note that there is no removable cowl. RIGHT: The rudder is manually adjustable. The ring ■ the tail wheel wire is for a stooge (see page 46 for details on how to build this helpful device).

Sporty? Squarish? Sleek? Plain? No matter what your opinion of the Akro's lines, it leaves those all-important judges with a smile.

FULL-SIZE PLANS AVAILABLE—SEE PAGE 96

Can't find a patsy to stand around all day launching your CL models? Then you need...

THE STOOGE

by Charles A. Felton

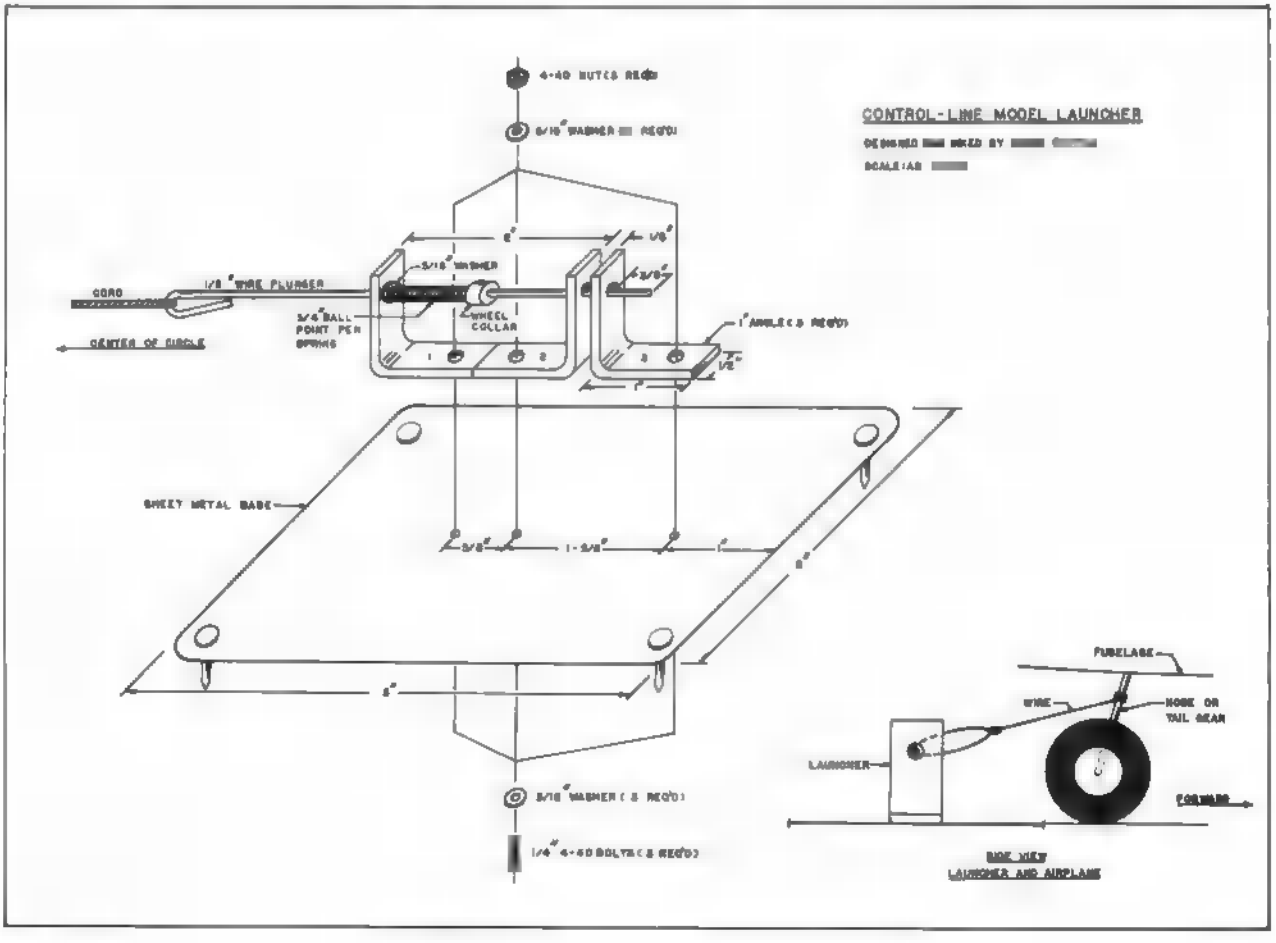
How many times have you cancelled plans to fly control line because you couldn't find anyone to help launch the models? Or maybe you enjoy flying by yourself, away from the crowds. Well, end your frustration by building this control line Stooge.

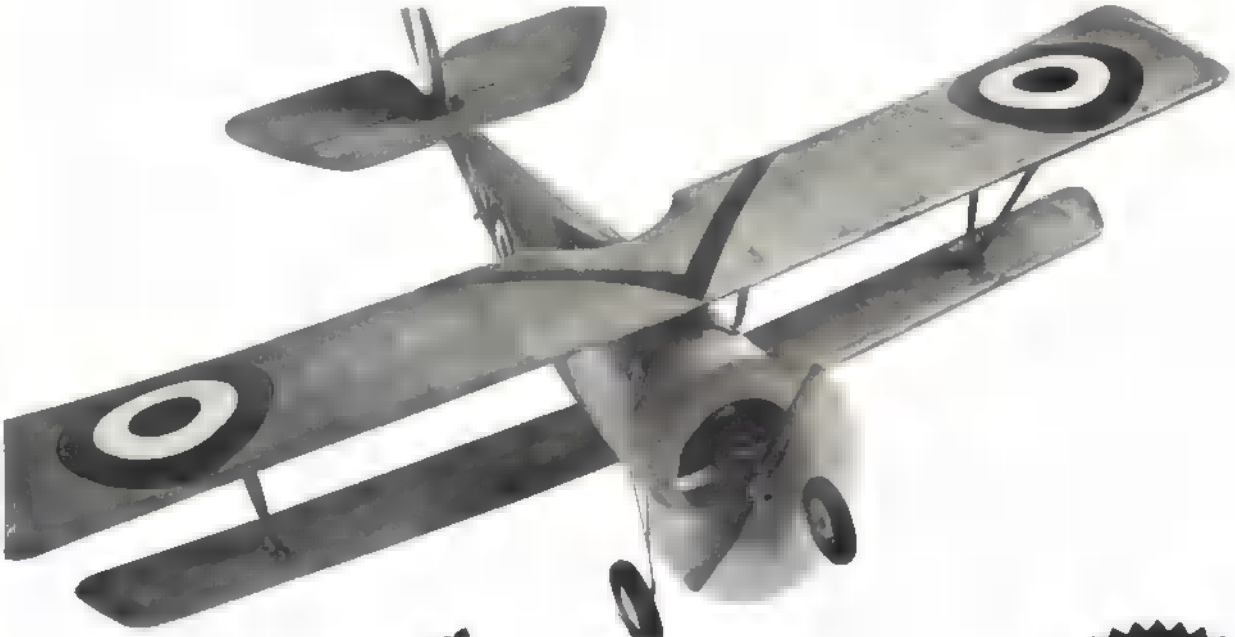
The launcher was designed to be simple, inexpensive, easy to build and, above all, reliable. Well, simple it is, with only one moving part. It's inexpensive, since the parts you don't have lying around your workbench will cost only about $1.00. The fact that it uses readily available parts with only one part to make (the wire plunger) makes for easy building. Over four years of launching my scale CL models without a failure attests to its reliability.

The launcher is simple to use, too. First, fix the sheet metal base to the ground. For flying on grass, drive 8-10" nails into the ground at the four corners of the base. I generally fly on asphalt or concrete, so I use 1" nails made especially for penetrating hard surfaces. Once the base is nailed down, lay out the release cord to the center of the circle, and the launcher is ready for operation.

The side-view drawing shows the general arrangement of launcher and model. A piece of heavy wire is attached to the nose or tail gear of the model, with a loop formed in the other end of the wire. The plunger is pulled back and the loop is inserted in the 1/8" space between angles 2 and 3.

Start your engine as usual, walk to the middle of the flying circle, pick up the control handle, check up and down elevator, give a slow, steady pull on the release cord, and you're off and flying.





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Lucky Penny

by Tom Sova

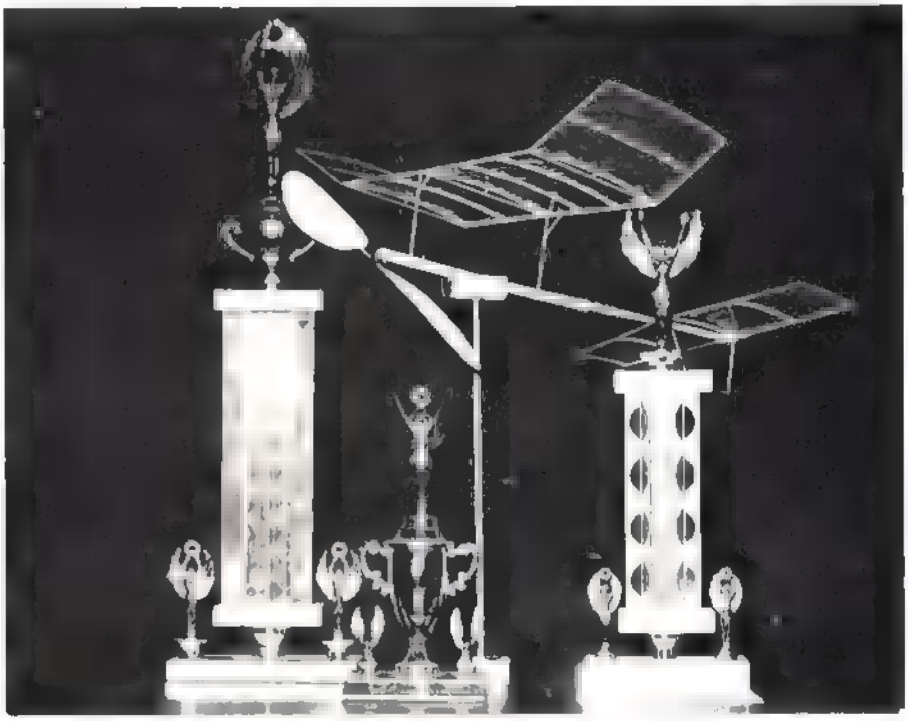
Build Pennyplanes as a club project this winter. They are great fun, and perform well in a school gym. Lucky Penny is the ideal beginner's model.

Indoor modeling is the most rewarding field of model aviation. Building time is short, material cost is almost nothing, and the result is a model capable of tremendous performance. Lucky Penny can easily be built by the beginner in indoor modeling. Currently, the plane has three first-place trophies to prove its performance capabilities.

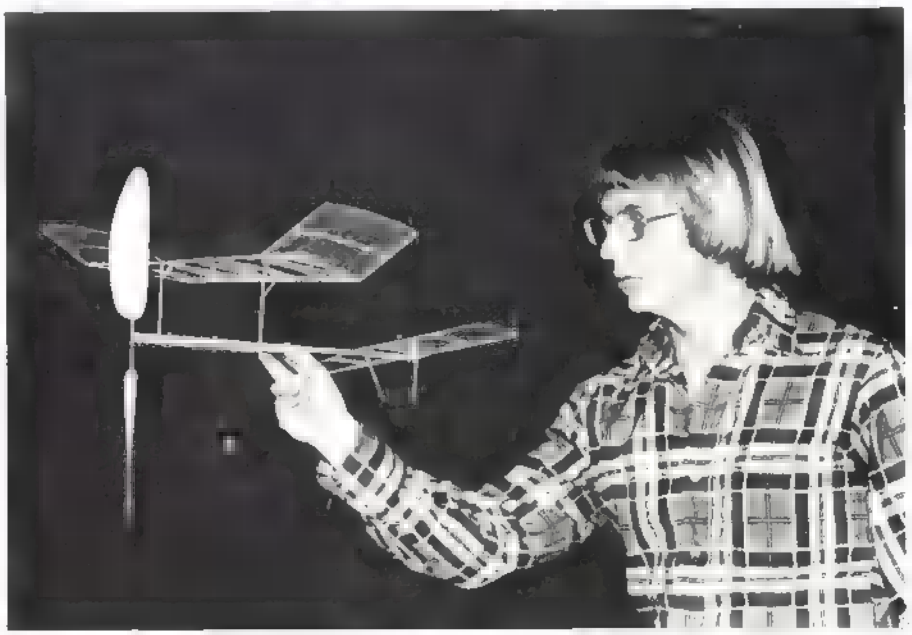
The Pennyplane event was originated by Erv Rodemsky and the Chicago Aeronauts. The purpose of the event was to put limitations on a model so that the expert and the beginner are competing on much the same level. The model's minimum weight, that of a new copper penny, yields a strong airplane. Lucky Penny can be built entirely from 5-8 lb. balsa (commonly available hobby shop balsa), and still be a fraction underweight. It is better to build a little light, and then add weight where it is needed.

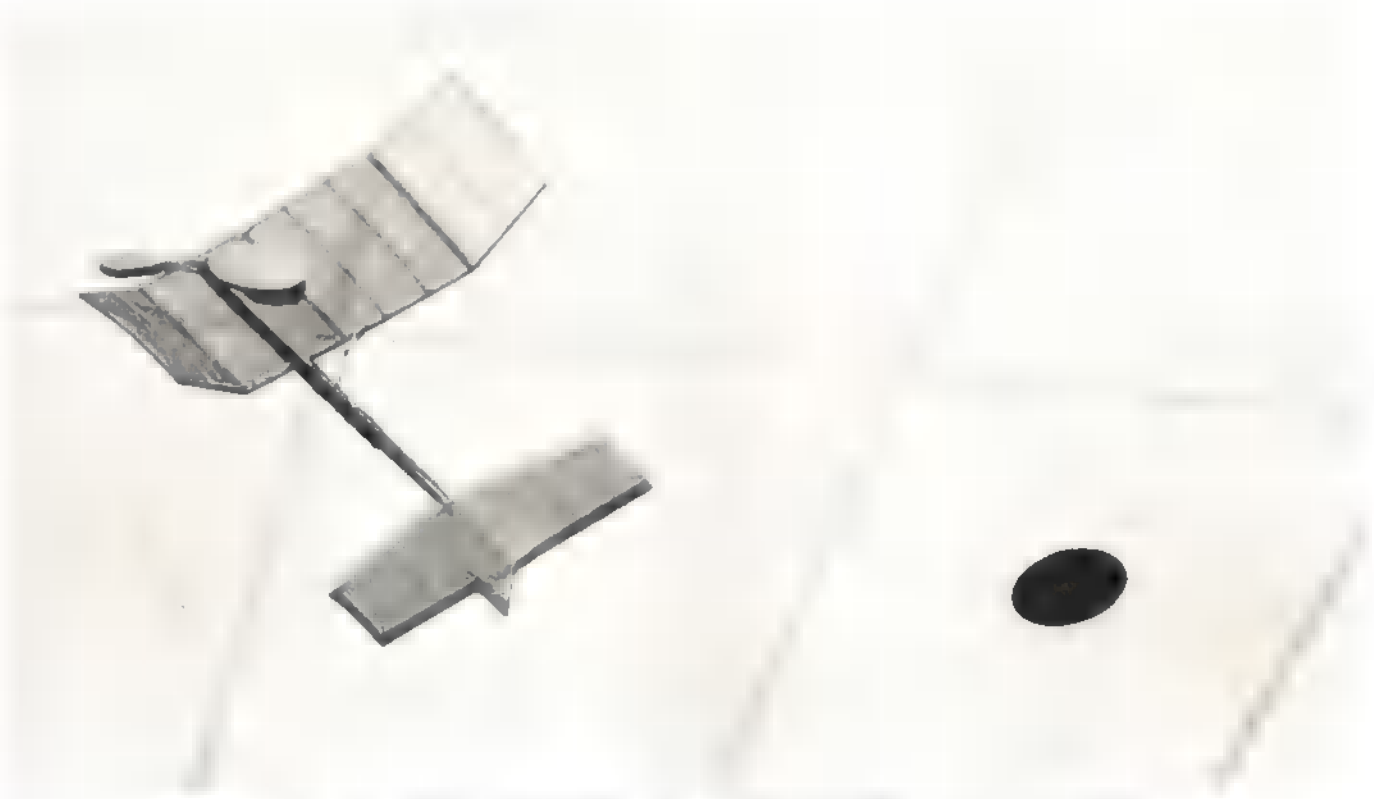
I designed Lucky Penny with square tips and straight spars so that building templates wouldn't be needed. This reduces construction time considerably. The wide wing and large stab reduce the wing loading, thus producing a slower flying airplane. The ½" stab tilt, along with rudder offset and wash-in (leading edge high on left wing panel), keep the plane in a tight circle, allowing it to fly between lights and girders.

Time should be taken in selecting good wood (even at the risk of being brutalized by your friendly hobby shop owner). The motorstick and tailboom blanks and all ribs are cut from a light sheet of 1/32" Sig contest (C-grain) balsa. Spars for the wing and stab are cut from a hard, stiff sheet of 1/32" B-Grain (C-Grain can be used if necessary). Wing posts and prop spar are cut from a stiff sheet of 3/32".



ABOVE: No slouch, the Lucky Penny won the '72 NATS and has accrued many more trophies since. BELOW: As the prop whirrs away madly (?), the author does a gentle penny toss. Pennyplanes make good cents.





Lucky Penny prop-walks under a low ceiling. It's not fragile at all. Build ▬ in only two evenings.

The motorstick blank should be cut and sanded with 400 paper. Soak the blank in warm water for about five min. Drain the excess water from the blank and roll it around ▪ 5/16" OD tube. Wrap the complete assembly in tissue (tape can be used to keep the tissue from unrolling). Bake the form at about 150° for half an hour. When cool, carefully remove the balsa blank and begin gluing the seam immediately. Do all gluing with a minimum of adhesive—you'll be surprised at how little glue is needed. Make sure that the tube comes out as round as possible.

The same technique is used in rolling the tailboom. A tapered boom form is used instead of the 5/16" dia. tube. An excellent steel boom form can be purchased from Micro-X Products, or you can turn down ▪ dowel rod on a drill or lathe.

The motorstick assembly can be completed by gluing the thrust bearing and rear hook to the motorstick. Insert the tailboom in the motorstick and glue it.

The wing spars are cut on a smooth surface, using ▪ metal straightedge and a sharp razor blade. To keep the spars straight, make several light cuts with the razor blade, instead of one heavy one.

Ribs are made in ▪ similar manner by using ▪ metal template of the airfoil. Make ▪ cut following the template. Move the template down 1/16" and make another cut. Again, to keep the ribs from distorting, make several light cuts instead of one heavy one. It's a good idea to cut a few extra ribs and select the best ones for use.

The wing spars are spot glued (on edge) to a building board that has the wing outline on it. Glue the ribs in place.

Micro-lite is the best covering material available for Pennyplanes. It's strong, light (only .006 oz. per 100" square), and easy to handle.

The wing is covered while it is still glued down to the building board. Thinned rubber cement is brushed onto the middle three ribs and the spars between these ribs. Allow the rubber cement to dry. Carefully lay the Micro-lite over the wing and stick it to the wing section that has the rubber cement on it. Fold back the Micro-lite where there is no glue and apply rubber cement to the next section. Continue this process, working from the center section toward the tips, until the wing is completely covered.

Remove the wing from the building board with a razor blade or solvent. With a new, sharp blade, carefully trim the excess covering. Crack the spars at the dihedral breaks and add 2¼" dihedral to *both* tips. Support the wing on two coffee cans, and glue on the wing posts and gussets.

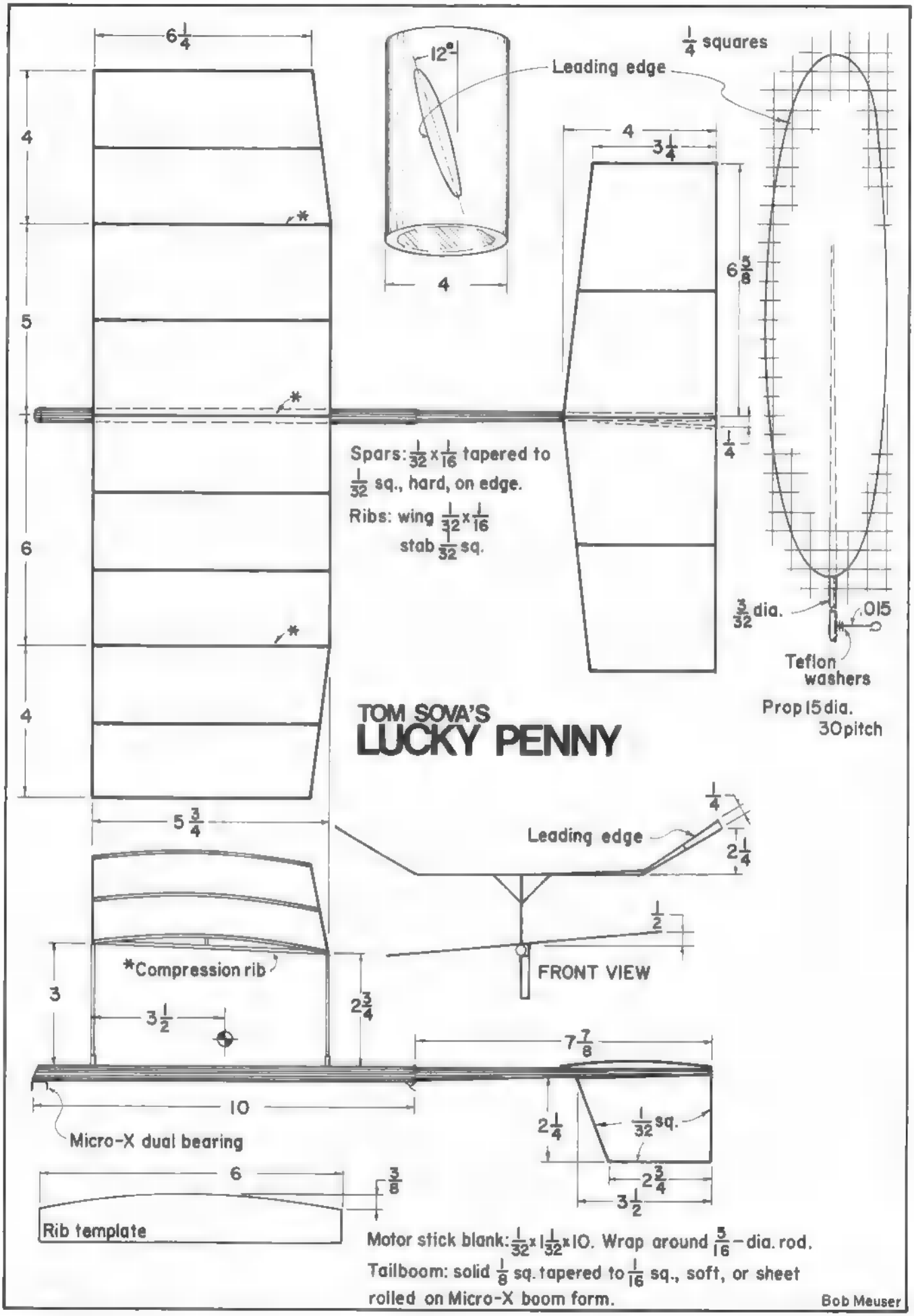
The stab and rudder are built using the same building and covering technique as the wing.

The prop spar is cut to size and sanded round. Bend the prop shaft and fasten it to the prop spar with several coats of glue. The prop blade outlines should be traced on a sheet of 1/32" C-Grain. Cut out the blanks and sand them carefully to about .020" thick. Keep the blanks in warm water.

Drain off excess water from the blades and wrap them around a 4" dia. can at ▪ 12° tangent angle from the vertical centerline of the can. The blades are held to the can by wrapping ribbon or strips of Jap tissue around the can. Bake the blades on the can for about 15 min. at about 200°.

Make two 45° triangles by cutting ▪ 2" square from 1/16" sheet balsa. Cut the square across ▪ diagonal, and the two resulting triangles will be 45° each. Glue the triangles onto the building board parallel to each other and 4 3/4" from the centerline. It is important that the left triangle's high end is nearest you and the right triangle's high end away from you. Glue the blades to the prop spar. While the glue is still soft, place on

(Continued on page 110)


6 1/4
4
5
6
4
12°
4
1/4 squares
Leading edge
4
3 1/4
6 3/8
1/4
Spars: 1/32 x 1/16 tapered to 1/32 sq., hard, on edge.
Ribs: wing 1/32 x 1/16
stab 1/32 sq.
3/32 dia.
.015
Teflon washers
Prop 15 dia. 30 pitch
TOM SOVA'S
LUCKY PENNY
5 3/4
*Compression rib
3
3 1/2
2 3/4
Leading edge
1/4
2 1/4
1/2
FRONT VIEW
7 7/8
10
Micro-X dual bearing
2 1/4
1/32 sq.
2 3/4
3 1/2
6
3/8
Rib template
Motor stick blank: 1/32 x 1 1/32 x 10. Wrap around 5/16 - dia. rod.
Tailboom: solid 1/8 sq. tapered to 1/16 sq., soft, or sheet rolled on Micro-X boom form.
Bob Meuser

The Infectious Mite

"It's just ■ real shame knowin' you're flyin' across the country with nothin' but ■ matchbox strapped to your ass."/by M. B. Groves

The weather over north central Texas that warm spring afternoon was CAFB. . .a day just made for punching holes in the sky.

I was enjoying the enjoyment of my toy, a "new" used Mooney Mite, and I'd been tooling around for about half-an-hour when I decided to head for home, via Amon Carter Airport. I figured I'd impress the Feds in the tower for a change. There never ■■■ much doing over there, so they had plenty of time to be sticklers about radio procedures. And just before takeoff, I'd finished installing a new Narco 12-channel transceiver (complete with transmitter button on the stick), so I decided to give 'em a yell, just to let 'em know I was passing through.

Five miles ahead of me, a couple of huge concrete ribbons stretched across acres of spring wildflowers. Down there, on the rolling plains that kept Dallas and Ft. Worth at a respectable distance from each other, Amon Carter stood lonely. In those days—in the Fifties—looking down on the airport, it seemed ■■ though some giant's kid had been playing "airport" out in the back yard . . .and then had gone off and left it.

There, plunked down in the middle of fields of bluebonnets and mustard weed, you could see ■ modern terminal, the American Airlines hangar, and ■ couple of smaller ones with an airplane or two scattered here and there. Across the way, there was the control tower rising up to the sky—overlooking plenty of nothing.

Making sure I'm in good voice, I clear my throat before punching the button on the joystick: "Amon Carter tower, this is Mooney Mite 4173, five miles southwest at 4000; heading eight-five. Any traffic?" (I know there isn't ■ thing but grasshoppers and bumblebees for miles.)

A voice comes right back, clear ■■ a bell and with just ■ hint of Texas: "Mooney Mite 4173, say again your position."

What's going on? Am I garbled? Is something amiss in the tubes?

Self-consciously now, I speak a little louder: "Ahhh—Amon Carter, this is Mooney 4173, less than four miles southwest at 4000. Do you read?"

No reply.

I am now convinced that I've wired up something screwy: "Amon Carter, Do you read? Over!"

I hear the tower come on and, after ■ pause, a drawl comes through in lofty calm: "Mooney Mite 4173, you must be in error, relative your position. We don't have you on our radar."

What's this? They're saying I'm lost? Me? Lost? No way! Why, I'm midway between Dallas and Ft. Worth. There's Dallas, clearly visible to the east. And that's Ft. Worth, back there to my left. And there're the runways, the tower and Amon Carter terminal. Wot-the-hell, I can see it. Oh, wait ■ minute. . . either their radar isn't working. . . or they're pulling my leg. Don't have me on their radar, eh?

"Amon Carter, I have you in sight. Stand by."

I hear their confirming "click" as I take a few turns off the vernier throttle, slow up a bit, and then manually (how else?) lower the world's fastest retractable landing gear.

Click: "Ah hah! *There* you are, Moon-knee Mite Four-One-Seven-Thuree. We have you now. . .what'd you do, sonny, open up your little bitty canopy on your little bitty airplane, and wave yo' hat? No traffic. Have a nice flight, but y'all hurry on home now. Yo' Ma-

Tenderly working his vernier throttle, Dan Shumaker casually pulls alongside for his portrait.

Very early production M-18 Mite displays super-clean lines. Radiator for its liquid-cooled Crosley Cobra engine rides beneath the fuselage. *(Photo courtesy Smithsonian)*

ma's callin'."

Is this the way it's going to be? One insult after another? "Little bitty" indeed! Here I am, flying one of the most efficient airplanes ever built, and I have to put up with sarcasm. Admittedly, Al Mooney's design is a bit small. But my Mite, grossing at only 850 lb., reflects years of work, optimizing on the design of a lightweight, low-wing, single-place airplane.

Fighter-like in appearance, it has an extremely clean airframe with a high aspect ratio wing. With the gear sucked up in the wing, it moves out smartly on its 65 hp Continental.

Al Mooney already had a string of successful, efficient designs to his credit by the time the Mite was conceived in 1946. Just 20 years before, at the age of 19, he was a draftsman and assistant to the chief engineer at Alexander Aircraft in Denver. It was from here that the classic OX-5 powered Eaglerock became a standard.

Later, as chief engineer at Alexander Aircraft (1928-29), he was responsible for the Bullet, an advanced, high-speed, low-wing monoplane. With Mooney-patented retracts, the Bullet was a mild sensation, and ahead of its time. On the other hand, it possessed some unusual spin characteristics. Although it was almost impossible to get one into a spin, once into it. . .

Then, at the height of the economic boom in the early part of 1929, he left Denver to form Mooney Aircraft Corp. in Wichita, Kan. Here, he designed and built a more advanced low-wing monoplane—the Mooney A-1.

The A-1, like the Bullet, was designed for efficiency. And, in order to prove its performance early in 1930, Al decided to attempt a transcontinental, nonstop flight from Glendale, Calif., to New York. The A-1's normal, 46-gallon fuel capacity was increased to 186 gallons, and if the Kinner hadn't given up the ghost over Ft. Wayne, Ind., some 22 hours later, he probably would have set a record.

Then the full force of the Depression hit the Mooney Corp. and, in 1931, it closed its doors.

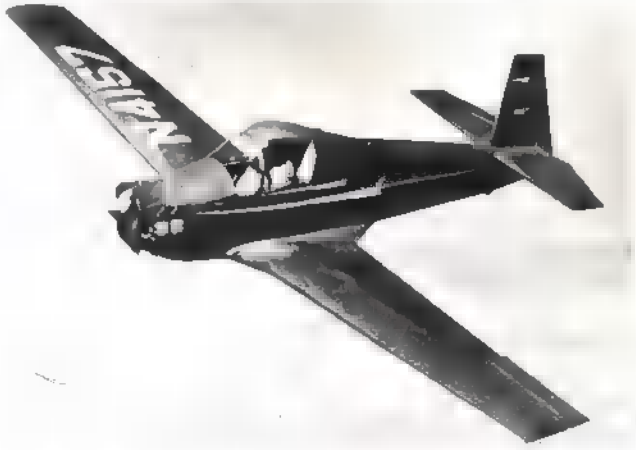
By 1934, Mooney was with Bellanca, where he spent a short period as its chief engineer. It was during this period that he greatly influenced the design of the very successful Bellanca low-winged wooden wonders—a version of which is still being produced.

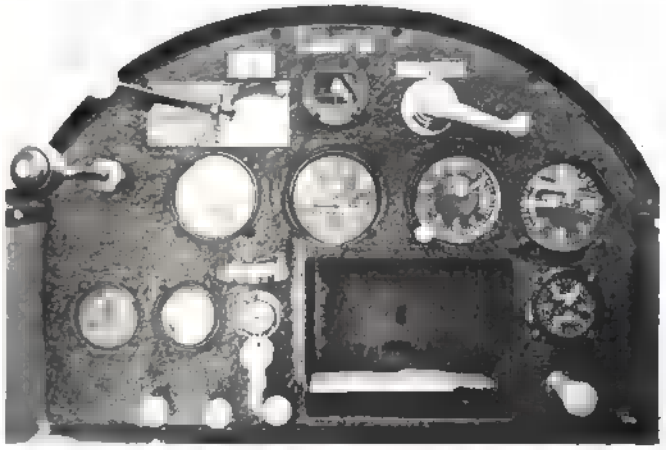
Then, becoming vice president and chief engineer at Monocoupe Aircraft, another Mooney classic, the Dart, was produced. Unmistakably, the Dart had "Al Mooney" written all over it. And when Culver Aircraft purchased the design, prototype and tooling for the Dart, Al followed right along with it. During his days at Culver, he designed the famous and fully aerobatic Cadet.

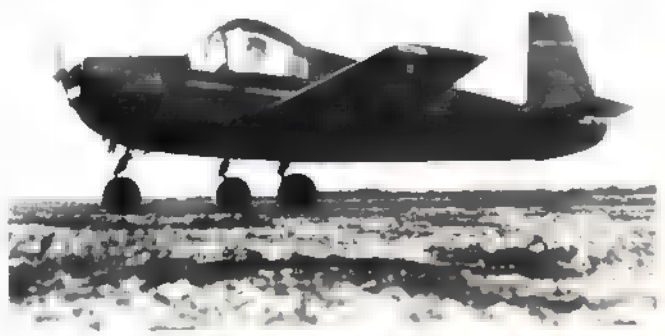
With its elliptical wing and retracts, the two-seat Culver Cadet was efficiency unparalleled (and by then, the "Mite"

The saddest day in a Mite owner's life comes the last time he [redacted] himself out of the cockpit, and watches it fly away with someone else crammed inside. *(Photo courtesy Mooney Aircraft Corp.)*

[redacted] no radio, there's room for a brown bag, in-flight lunch in Dan Shumaker's M-18C. Upper left side of panel houses the Wig Wag (gear up) Warning device included for [redacted] forgetful—such as Al Mooney.







Rare shot of the M-19 "Cub-Killer" and close-in support weapon proposed to the Army during the Korean War. *(Photo courtesy Mooney Aircraft Corp.)*

The author's beloved Mite, ▬ depicted in the drawing on next page—all yellow with black trim, complete electrical system, starter and generator. Gross weight (including author) 850 lb.

was germinating). Over 350 Culver Cadets had been produced when World War II erupted.

The Culver Co. then turned to the production of radio controlled target drones and, by war's end, they had produced over 3,000 of the PQ-8 (a drone version of the Cadet) and PQ-14 (its successor) RC target drones.

The wartime, tricycle-geared, bright red PQ-14 was the direct ancestor to the diminutive Mite. In 1948, the Mooney Aircraft Corp. was resurrected in the hope of cashing in on the expected post-war aviation boom. Its first offering had a span of 26 ft., 11", and sported ▮ 25 hp, liquid-cooled Crosley Cobra automobile engine. The first Mite, with its now-famous "backward tail," hit the sport aviation world with ▮ price tag of less than $2,000, and represented the cheapest, smallest aircraft to be produced in quantity.

During delivery of the first production Mite to a dealer in California, the airplane was flown the 1,200 miles from Wichita to Santa Monica, with a total gasoline cost of $7.00. At 50 miles to the gallon and ▮ range of 400 miles, ▮ pilot's new dream ship was suddenly on the market. Full of innovations, it didn't have any weird flying characteristics—well, except for a strange metabolic change that came over the pilot who "put" it on.

Once in the cockpit, the pilot, whose weight could easily equal 25% of the total gross, came close to satisfying any long-dreamed-of desires to be a fighter jock.

It drew attention everywhere it landed. People couldn't keep away from it or off it. And with that backward tail, it appeared to be super-fast. For speed, it achieved ▬ much as one could expect out of whatever was up front, be it 25 hp Crosley, 65 hp Lycoming, or 65 hp Continental.

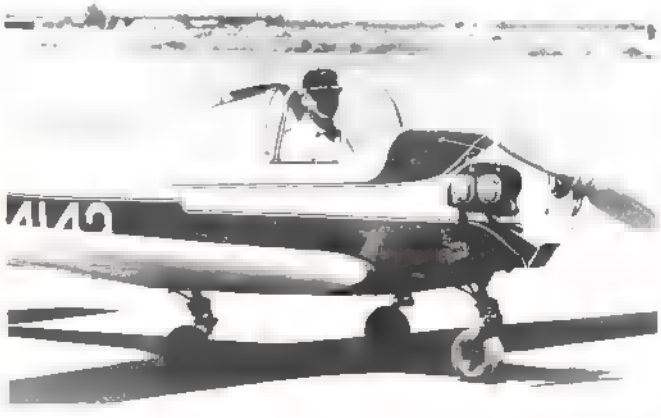
Economy and efficiency with the "big 65s" were incredible. Three and one-half to four gallons an hour, at between 120-130 mph, provided very cheap transportation and the greatest fun flying ever conceived.

There were ▮ couple of drawbacks, however, that slightly impaired sales during its total production run of 264. One was the fact that a pilot was limited to what he could carry, since performance ▬ highly dependent on pilot weight and how the aircraft was equipped. For example, my N-4173 (one of the last produced) was the Cadillac of the Mites. It had the larger cockpit and canopy, and the Continental 65 had ▮ full electrical system with starter and generator. After I'd swaged myself into the cockpit, I could (legally) carry ▮ gallon and a half of gas!

The other drawback was the introduction of retractable landing gear to pilots who had been, in most cases, trained on Cubs. These low-time, Cub-trained pilots would get all fascinated with their landing approaches, and then

Dan Shumaker's spotless M-18C sits ▬ the ramp at Tracy (Calif.) Airport. Flaps are lowered ▬ the full down position.

After 15 "Mite-less" years, the author once again strains the load capacity of one of Al Mooney's designs.



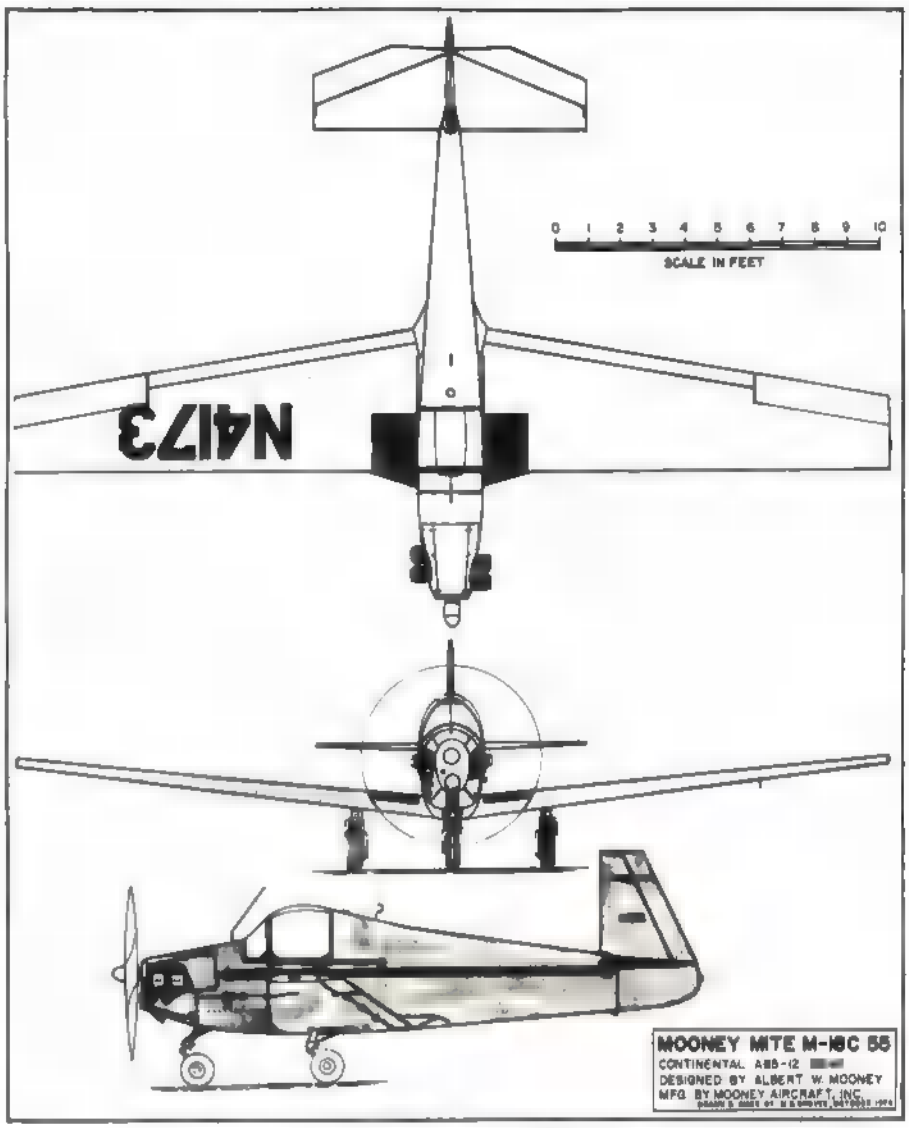
make the most beautiful gear-up landings. Although always embarrassing to the pilot, the damage to the airplane usually was slight. However, the splinters from the 66" wooden Sensenich prop flying in all directions tended to attract attention.

It's reported that even Al Mooney did it while on a demo flight, and he had to make a very red-faced phone call back to the plant for a replacement propeller to be sent out A.S.A.P. After that incident, he invented the Wig Wag Warning device, which waves—frantically—when you throttle back with the gear up.

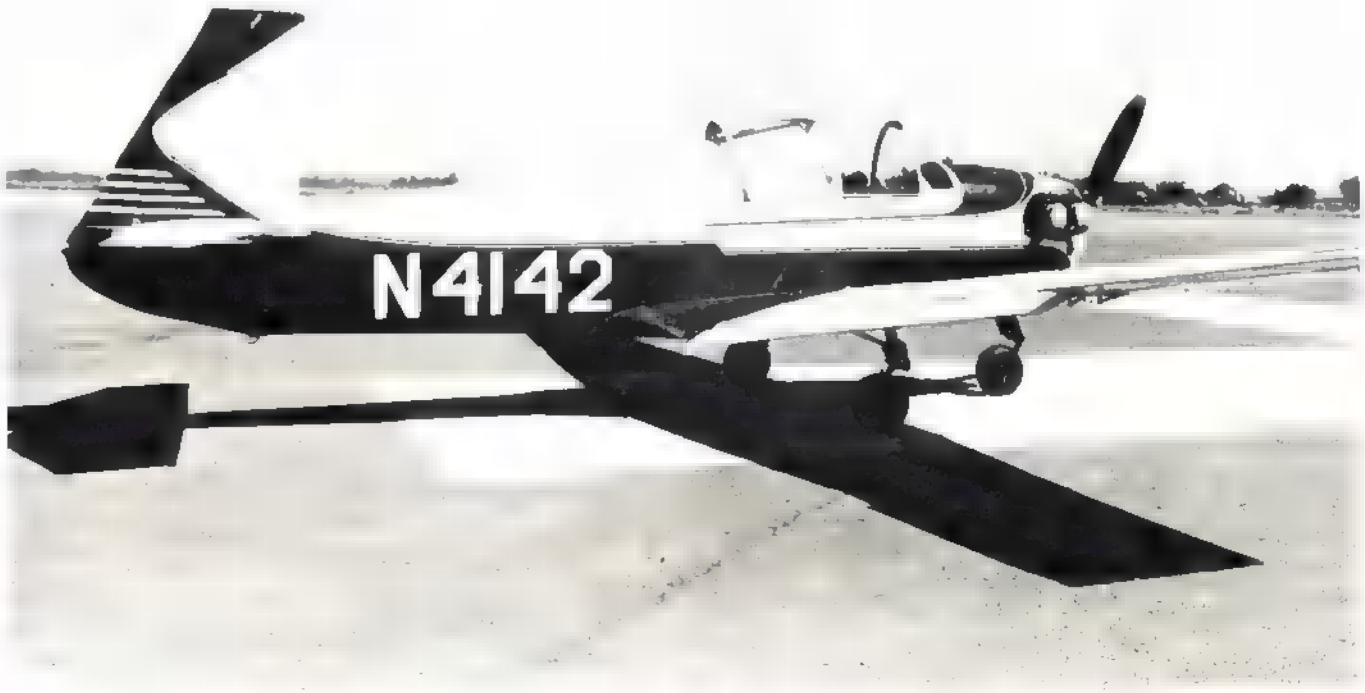
In May, 1951, during the Korean War, a frustrating attempt to militarize the Mite was initiated. On the strength of some frothy promises by the Army, the Mooney Co. conceived a counter-liaison, or "Cub-Killer," aircraft. At their own expense, Mooney outfitted a special version of the Mite, which company records show as: AIRPLANE, Liaison, Counter; Mooney Model M-19.

With this very military moniker, the Mite was then equipped with a constant-speed Flottorp prop in front of a 90 hp, fully cowled Continental power plant. Buried in the wing were two M1919A4, .30-cal. light machine guns. For an additional mission of close-in ground

(Continued on page 111)



Shumaker's Mite carries a chocolate brown and white color scheme.



Hold it a second

From the originator of radio control comes a new line of Radio Control Systems that offers unparalleled ease of operation and responsiveness. The new Citizen-Ship 2, 3, 4 and 6 channel Velvet Touch Mark II systems provide greater comfort, better control, more equipment. See the features that make The Velvet Touch Mark II something to grab hold of. Hold it a second at your hobby center.

A Fistful of Great Ideas:

- Completely redesigned circuitry for more precise control and greater durability
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- Retractable swivel antenna that automatically cuts off power when telescoped into case
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RC SuperStar Car

Don't let that pulse system sit idle this winter. Have ■ ball in your living room for less than $7.00 and an hour's work. /by James M. Petro

In 1971, our family became involved in converting ■ Cox Baja Bug into an RC pulse system car. It was so successful that others built and raced them, a Jerobee system was marketed for them, and our construction was published in *Pit Stop* magazine. The poor Bug is now worn out, and we have been looking for another car to convert, preferably an electric one.

Just as with the Bug, ■ sale was run on the Mattel SuperStar electric race ■■ at a fantastically low price of $6.88! What could we lose? If you follow this article, you can easily have one running in an hour.

The first thing to do after reading the Mattel instructions is to test-run the engine half-a-dozen times to see if it works properly.

Where did they get those egg-shaped sponge tires? All four on ours were about ½" out of round. Thank goodness the sponge tire is impaled on wheel pins, so that all you need to do is pull and work the high side down and the low one up.

Make a quick check for receiver and battery rough-fit. Our ACE DE is securely wrapped in ■ foam-packed, water-resistant package. It rests on the platform between the gear housing and right rear wheel. The rear edges of the receiver and platform match up. The battery pack is ■ four-cell stacked pack which nestles neatly in the power unit next to the motor. Remember the hot battery and motor, and leave some clearance if your pack is too big. If the fit looks good on both, mount them in place with servo tape.

The receiver switch I prefer is high-quality, sealed, subminiature toggle type. It fastens to the rear body mounting box with a spot of plastic glue, and the toggle protrudes through a hole in the bottom.

The power plant required a couple of alterations. First, ■ tab sticks out and interferes with the receiver—cut it off. Next, pull off the rubber cone, gear and its shaft from the power plant. That gives more receiver room and stops power loss to the cam drive, which is no longer used. Before installing the unit, put ■ single drop of oil on the motor bearings, rear axle bearings, and gear teeth in the drive train. Snap the power plant in place (per the car instructions) and check for proper mesh and fit. Give ■ half-min. charge to test the drive train action.

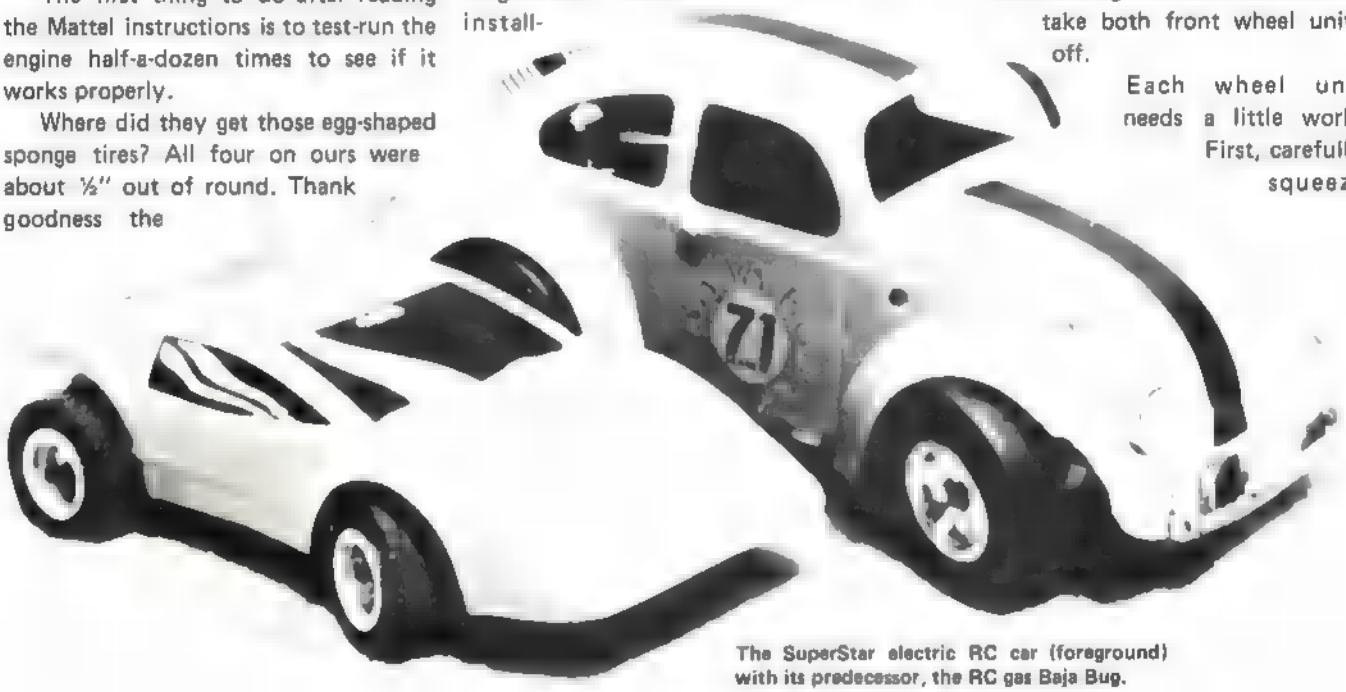
Fixing the steering mechanism up will take you about 15 min. The spring-loaded, cam follower arm and spring are removed and discarded by pulling out the nail and washer. This is best accomplished by first teasing it up with a screwdriver under the washer, and finally pulling it out with pliers. Just forward of the boss, the nail is fastened into a shorter, hollow boss. Use ■ 5/32" drill, and drill through this hollow boss to ■■ it to mount the actuator. The nail boss needs to be cut down to the same height as the drilled boss to get a level actuator mounting. It is easy to snip off most of it with a diagonal wire cutter, then trim the rest with ■ sharp knife.

Under the front end, there are one large and two small tabs, which are part of the steering bracket. They fit through and hook onto the chassis. Pull the large front one to the back and push to release into the slot. This lets the bracket rotate enough to have clearance to take both front wheel units off.

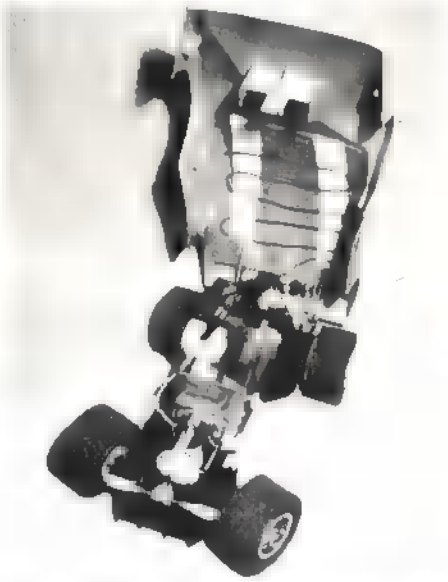
Each wheel unit needs a little work. First, carefully squeeze the wheel in ■ vise to push the axle in for ■ less-sloppy fit. Protect the chromed hub with scrap balsa. The axle may poke out of the center of the hub slightly, but ignore it.

Second, enlarge the existing hole for ■ good, free fit of the clevis. The third is optional: the kingpins fit very loosely in the holes. The cam can be bushed-up with ■ brass tube sleeve on the pins. Actuators are very tolerant of the loose fit, but ■ servo needs something better.

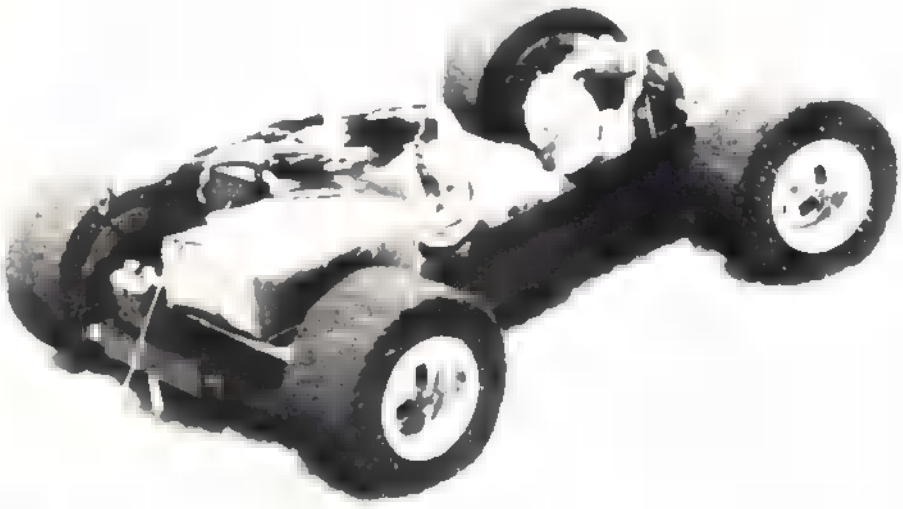
In just a few minutes, you are going



The SuperStar electric RC car (foreground) with its predecessor, the RC gas Baja Bug.



Detail shot of the guts of this mini-mechanical wonder. This is about [redacted] hour's work.



The component installation is compact, lightweight and maintenance-free.

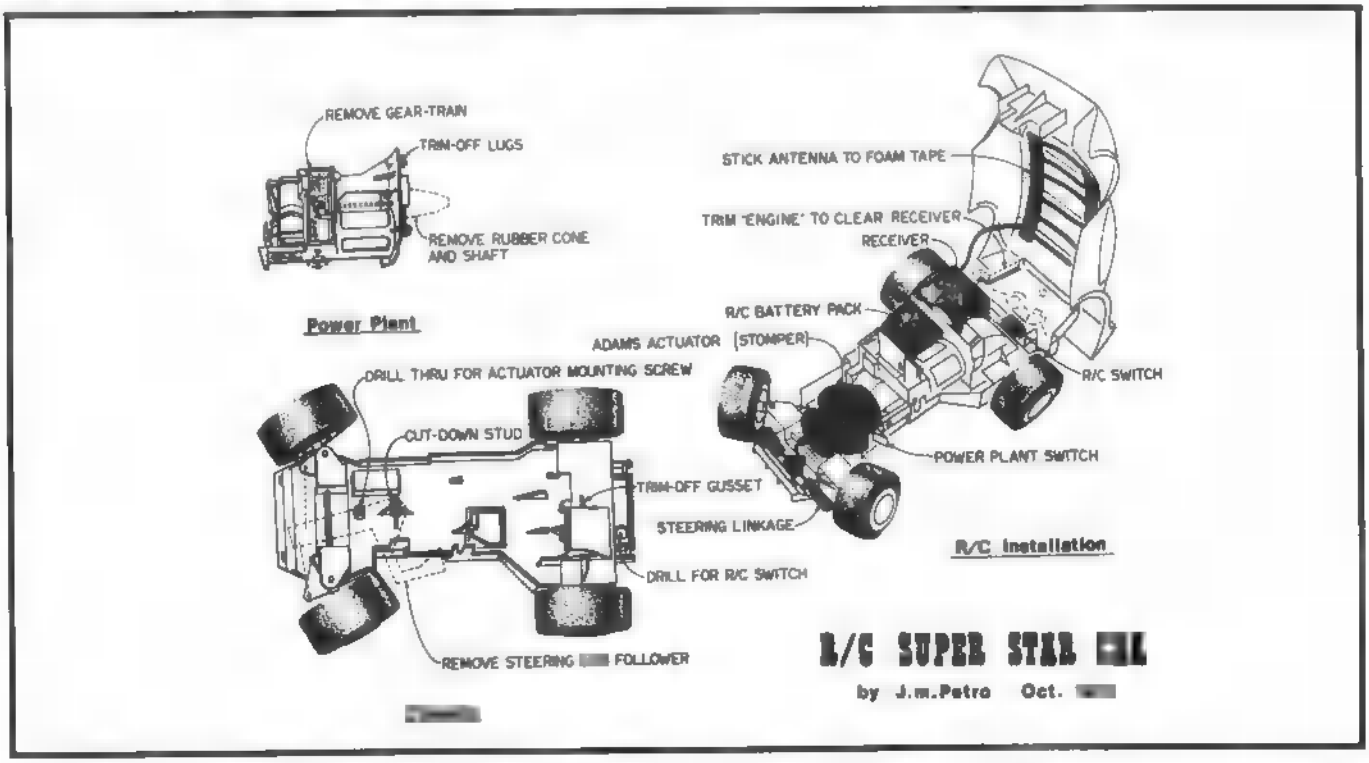
to zip through the biggest hang-up we had. Cut a 1 3/8" long piece of 2-56 threaded rod and assemble with a nylon clevis. Jam a nut on each end. Install an aileron link fitting at the center, with the set screw facing up and forward. Drill a 3/32" hole in the aileron fitting, midway between the existing hole and the rod. Screw the clevises in so that their pins are slightly closer together than the distance between the kingpin bracket hole centers. The clevis pins should be facing down.

Assemble the clevises to the wheel units and put the kingpins in their holes. Snap the bracket back down into its slot. The aileron link points to the rear and rests on top of the bracket. Check for free movement of the steering assembly.

All that remains is mounting the actuator. The moving arm on the actuator should just clear the chassis as it swings. Ours had to be cut off a bit. Bolt the actuator in place, with the arm passing through the [redacted] hole in the aileron link. We used a new, longer bolt to mount the actuator, and snipped off the excess to clear the body. It also may be necessary to shim the actuator level with washers under the actuator on the bolt. Center the wheels and actuator, then lock the aileron link on the rod with its set screw.

We used two strips of servo tape to keep the antenna tucked neatly in place. Some trimming may be needed to the chromed engine at the radio switch to allow the body to remain raised.

It would be interesting to hear how some of you have increased your battery supplies for longer running time. I checked this unit's current drain to 6 amps. When we put some G.E. NiCads on this motor, the plastic battery holder melted around the metal parts! Wonder if the power plant plastic would melt with longer runs?



KWIK BILT T.M.

P-51 MUSTANG

Designed by MIKE STOTT

ENGINES: .45 - .60
WING SPAN: 64"
WEIGHT: 7 Lb.s
WING AREA: 700 Sq. In.

SIG
KIT KBRC-2
$48.95

KIT FEATURES:

- Precision-Cut Foam Wing Core
- Rugged Plastic Cowling
- Clear Canopy With Framing
- Formed Plastic Wing Tips
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- Sheet Balsa Tail Surfaces
- Pre-Bent Torsion-Bar Landing Gear
- Decorative Decal Sheet
- Step-By-Step Instructions
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HARDWARE PACK

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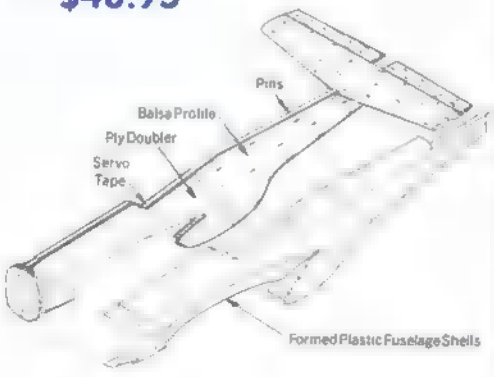
- Molded Nylon Control Horns
- Tuf-Steel R/C Links
- Double-Coated Servo Tape



Sig's time-saving, patented "Kwik-Bilt" system pioneered a revolutionary method of fuselage construction. The internal balsa profile carries the load of the engine and flight surfaces, protecting the molded plastic fuselage shell from vibration and fatigue. The ready-formed shell goes on effortlessly in a few minutes to produce a smoothly finished component, complete with panel lines and integral wing and tail fillets. Tail surfaces are sheet balsa and the foam wing core is covered with balsa planking, making these easy-to-assemble structures. The superb control response of these competition proven designs deliver picture perfect maneuvers. A great combination of looks and flyability.

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$3.95

Designed by PAUL McILRATH

WING SPAN: 20"
LENGTH: 18"

KIT FEATURES:

- Molded Plastic Cowling, Dummy Engine, Pants and Wheels
- Complete Building and Flying Instructions
- Detailed Plans With Isometric Views
- Molded Plastic Propeller
- SIG Contest Rubber for Maximum Turns and High Flight Performance
- Die Cut Sig Balsa Parts
- Covering Material

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It is not recom
airplane of the

SIG TIGE

Designed by PAUL McILR

SIG
KIT FF-22

$2.50

WEIGHT: 1 Oz.
WINGSPAN: 21-1/2"

CABINAIRE

Designed by PAUL McILRATH

$2.50

SIG
KIT FF-20

WINGSPAN: 22"
WEIGHT: 1 to 2 Oz.

Coming Soon

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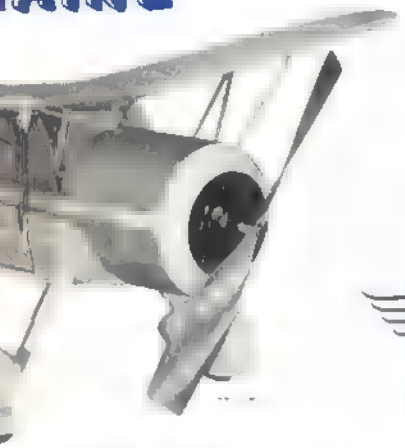

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aire is ■ challenging kit, designed for the experienced modeler. commended for beginners, who should start with a simpler he Classic series, such as the Tiger.

MINI-MAXER

KIT FEATURES:
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- Die Cut Sig Balsa Parts
- Covering Material

SIG
KIT FF-24
$2.25

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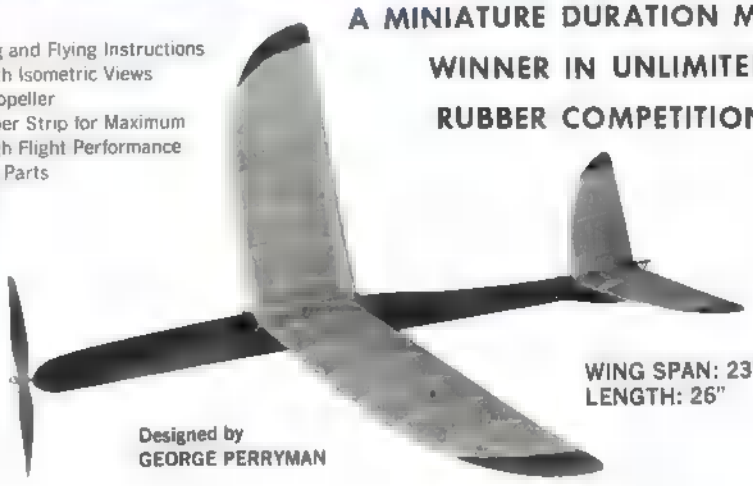
WINNER IN UNLIMITED
RUBBER COMPETITION



WING SPAN: 23"
LENGTH: 26"

Designed by
GEORGE PERRYMAN

This little gem from the drawing board of George Perryman, veteran free flight designer and competitor is another "model of ■ model" in the Sig Classic Series. A distilled version of his familiar Unlimited Rubber Craft, the Mini-Maxer has a flight performance of its bigger brothers. Two contest victories are already recorded, one with ■ 4-minute, 51-second out-of-sight flight. Needless to say, ■ pop-up tail de-thermalizer is standard equipment to keep the airplane from going cloud hopping.

ER
ILRATH

SIG

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"MODELS THAT REALLY FLY"

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(1) A proven flyable design.
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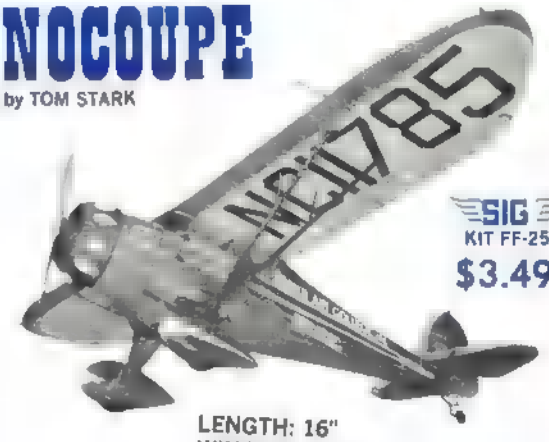
MONOCOUPE
Designed by TOM STARK



SIG
KIT FF-25
$3.49

LENGTH: 16"
WINGSPAN: 24"

The '29er
Designed by PAUL McILRATH

SPAN: 20-1/2"
LENGTH: 16"
WEIGHT: Approx. 1 Oz.

SIG
KIT FF-21
$2.50

Mr. Mulligan
Designed by TOM STARK

$3.25

SIG
KIT FF-23

WINGSPAN: 20"

Soon! MORE MODELS IN THE SIG CLASSIC SERIES

TERRY'S TONI

BY ▬ VIOLETT

Are you one of those sideline judges at the pylon races. . .really turned on by the action, but ■ little hesitant about getting in there and mixing it up?

If the airplane technology (or lack thereof) has been holding you back, you'll now have to look for another excuse. The Little Toni, as kitted by Prather Products, provides the best combination in airplane design and construction techniques, whether you are a novice or contest veteran. Undoubtedly, ■ good many Quarter Midget fliers will use the Toni to step up to Formula 1.

This project was inspired by the availability of the kit during my annual pre-NATS building bonanza. Eric Meyers, a young and upcoming pylon flier, (AAM's product manager) spent most of ■ three-week period ■ my basement. Together we hacked out what you ▬ here. The fact that the models didn't fly at the NATS is another story.

Terry has certainly built enough of these seems most reasonable.

Remove the components from their bubble packing and examine the numerous individual packages of special hardware items and band-sawn wood parts, and you will see that you have certainly purchased one of the most complete model airplane kits ▬ the market today. Truly ■ welcome step toward perfection for the competitive modeler.

The most obvious item in the package is the fuselage—a real time-saver. Pylon planes, by their very nature, must be expendable . . .there ▬ a lot of us who wouldn't have airplanes to race if it weren't for this technique of producing a compound-curved streamline form.

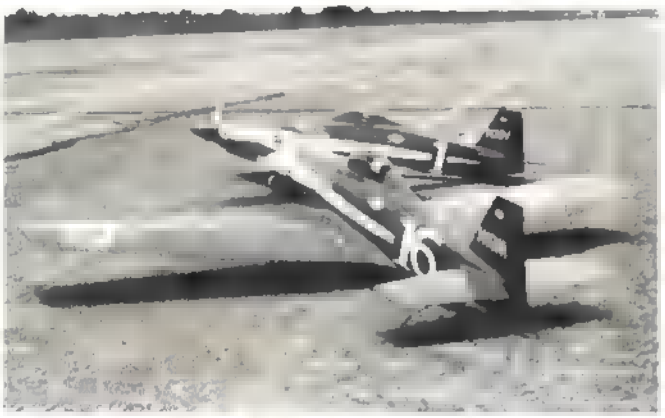
The materials and process chosen ▬ expensive to manufacture, but they produce the best results for the service demanded of ■ racer fuselage. A better glass-to-resin ratio is accomplished with this non-gelcoated epoxy system, making it more resistant to fracture and stress cracking.

securely epoxied with glass cloth to both the fuselage and left cowl cover plate. Drill and tap the front of the mount for 4-40 bolts.

We selected the Dzus fastener method for cowl attachment. The camloc knob molded into the fuselage can be removed, and the brass tank tubes ▬ protrude through this hole.

For a K&B installation, the cheek cowl can be slimmed. Carefully apply heat with ■ heat gun, and pinch the cowl in ■ holding jig of some sort, or in your hands with a terry cloth towel. When you are satisfied with the shape, cool it in cold water. It will hold its ▬ form. Re-trim the cowl to fit the fuselage, and coat it with ■ release agent such ▬ P.V.A. (polyvinyl alcohol) or fluorocarbon. Then, with Epoxolite, mold a retaining fillet around it. This will require a couple of applications, the last of which is a layer of 1 oz. cloth that holds it all together.

One aircraft ▬ built with this system, while the other used the Prather system—both functioned well. Spend some time on the



The raw kit. The best package on the dealer's shelf.

Wing with ▬ glassed in place.

Bob Rapidographs the rivet detail with ■ masked guideline.

Terry has produced for ▬ the finest possible Formula 1 racer in kit form that today's state-of-the-art will allow. Upon removing the decorative cover from the box, you will have to agree that he has put forth an effort reflecting the same thought and craftsmanship which he expends on his own personal racing machine. It would be hard for ▬ to put ■ price tag on such quality work, but $99.95

Tonis to best know how, so follow his instruction manual—it is excellent. This text should be used only ▬ a supplement to the instruction manual, ▬ I will occasionally interject hints that I found helpful, some of which apply to ■ K&B power package.

Fuselage: For additional vibration control, I supported the front of the motor mount with a 1/8" ply U-shaped former. This piece ■ front of the fuselage, making it neat and practical, because that's where it all happens ▬ ■ pylon racer.

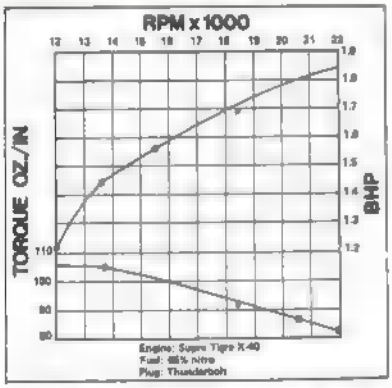
For wing hold down blocks, I prefer ¼" phenolic to the maple blocks provided. The phenolic will never strip out or crack. The model must last ■ long time before this makes any real difference, however.

(Continued ▬ page 104)

SUPERTIGRE X-40
DON JEHLIK

"Out of the box" is the term used by performance fliers when an engine runs "right" from the start. The SuperTigre X-40 tested is such an engine. It is the first ABC engine I have personally run that had a correct piston/sleeve clearance fit.

Since we already are inside the engine, let's take a look at the special features. Design is rear exhaust Schnuerle ported. The piston is silicon aluminum and the sleeve is chromed brass. The cylinder head has a large, flat squish band with an unusual double hemi-chamber. The chamber looks like one small-diameter hemi-shape on top of a larger hemi. Each is approximately .075" deep with the glow plug depth at .145". I've never seen this head design before.



The crankcase is split just below the exhaust port. This feature, as on the Taipan 15, makes it easy to form the transfer contours. This engine has the transfers machined instead of die cast.

The rest of the engine is typical Tigre: One-piece case with standard backplate/steel rotor assembly. The rod is bushed at both ends.

Test engine started on the second flip and continued to restart by hand throughout the test, like a Rat Race engine. It ran really well on 5 and 40% nitro fuels. A plug would blow after each couple of quarts of 40% brew. On 65% nitro, I encountered some problems. The

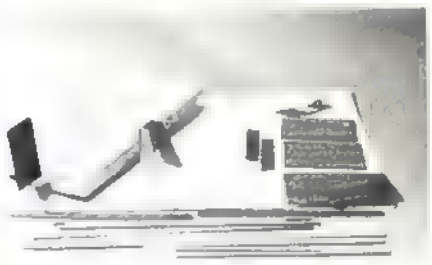
(Continued on page 106)

DUMAS LI'L SWAMP BUGGY
FRED M. MARKS

Relaxed fun at the local pond is the Li'l Swamp Buggy. With 18" length, 7 3/4" beam, and 2" freeboard, there is room enough for any RC equipment. Ours carried one channel of Ace Digital Commander 1-8 system, for control of the air rudder. No throttle is necessary.

As received, the Buggy is built from balsa longitudinal members over balsa bulkheads. The bottom and sides are balsa sheet. Top decking is mahogany veneer, which can be beautifully finished using varnish, epoxy, or polyester resin. Our buggy was assembled by a local DCRC member, Bert Belt. As it was constructed, the entire interior was protected with white dope before closing it up. The plywood engine mount and air rudder were finished with black epoxy, the hull was yellow, while the top deck was varnished.

The hatch was held in place by small wood screws spaced about 1" apart. A bead of silicon rubber bathtub seal was run all around the hatch jamb; Saran Wrap placed over it, and the hatch weighted to form a perfect seal. How good a seal? Our friend, Frank Williams, inadvertently flipped it upside down when it



swung too quickly into a strong crosswind. We let it drift to shore; there was no water in the compartment. The engine was flushed out and we put it back into action!

The antenna mast was a 1/8" nylon tube. The switch was mounted inside the compartment on a former and was actuated by a lanyard to the side of the compartment—no leakage there.

A Golden Bee was used with a Kavan tank extender for a long run. A throttle easily could be added. Li'l Swamp Buggy is a fun-performer and actually demonstrated full-scale characteristics on several occasions, when inexperienced operators let it wander up the edge of the pond and into grass, then back into water. No damage or problems occurred. We had hours of fun with the gang of kids who quickly gathered. This is a good way to learn that control is reversed when a boat (or plane) is coming toward you.

The plans are not as thorough as they might be and some construction steps are a little difficult for an unassisted youngster. So help him—then both of you can have fun at the pond.

Specifications: Beam—8"; **Length**—18"; **Freeboard**—2"; **Engine Size**—.049; **Prop**—6 x 3; **Floating Weight**—(with RC) 2 lb.; **Construction**—Balsa/plywood; **Price**—$7.95; **Manufacturer**—Dumas Products, Inc., 790 S. Park Ave., Tucson, Ariz. 85719.

THE TODI
JOHN HANKES

The design of the Todi is classical glider as it is presently known. It incorporates features found on full-scale sailplanes, such as flaperons and a T-tail. The Dodgson coupler allows for flap control with compensating elevator trim, aileron coupled with rudder, and independent elevator.

The plans come in three plates, one for the fuselage-rudder-elevator, one for the long wing, and one for the short wing. They are accurately drawn, with generous notations to complement the instruction booklet.

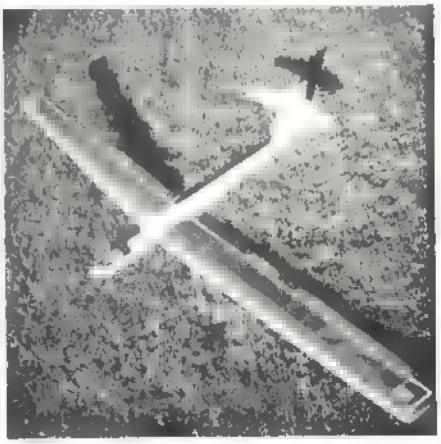
The kit materials are complete. The balsa is straight-grained and tends to be light, but is adequate to the task. And a big plus is that sheeting and strips come full-length. The hardware package provides most of what is needed, and items not provided are noted in the instructions, and readily available.

Construction began with the long wings. The structure is conventional and needs no comment. The ribs come machine-cut and must be trimmed to fit if the flaperon feature is desired. A rib index is displayed in the instruction manual for identification purposes. The elevator and rudder are 1/8" sheet.

What does warrant comment is the construction of the fuselage and vertical fin. Begin by laying out the frame for the vertical fin. This is covered with 1/16" sheet applied vertically. After one side is sheeted, the elevator control horn and linkage is installed, then the other side is sheeted.

The fuselage is made up of a molded glass front half, which comes complete. The rear half is a rolled balsa tailboom. The front of the boom is slightly oversized and must be trimmed to fit flush to the flange on the fuse front. After this fit is made, the boom is trimmed to proper length by measuring over the plan.

I strongly suggest making a jig at this point to assure a proper fuse-front to fuse-rear to vertical fin-alignment. Tape the fuse halves together, draw a reference line down the center of the fuse, then cut out the slot for the vertical fin. Separate the tailboom from the fuse front and glue the vertical fin in place. This is finished by gluing 1/32" sheet horizontally, installing the 1/32" plywood plates



which accept the elevator swivel tube, and capping front and rear with 1/4" balsa strips.

All of the control linkages must be installed in the fuse front before the tailboom is epoxied on. The fuse-halves are then epoxied together using the jig. The canopy is completed using the machine-cut balsa and die-cut

(Continued from page 109)

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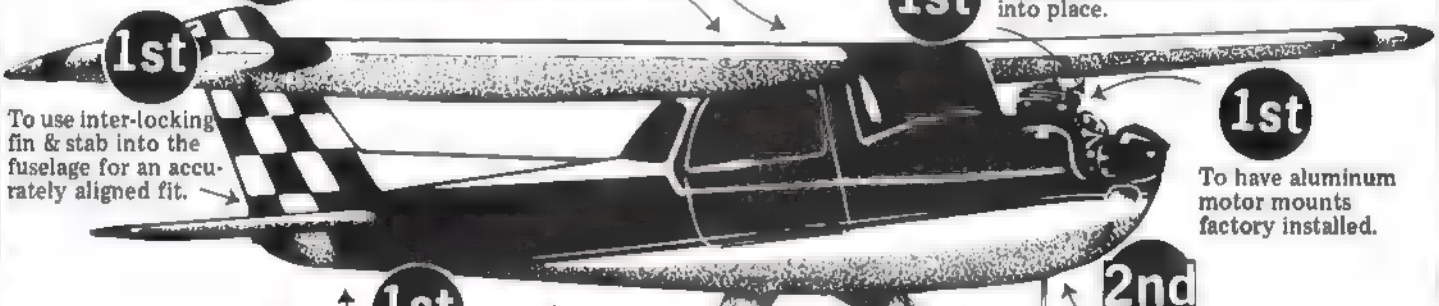
1st To have a radio compartment big enough to put your fist into.

1st To use (on foam model) a ¼" plywood firewall that's locked forever into place.

1st To use inter-locking fin & stab into the fuselage for an accurately aligned fit.



1st To have aluminum motor mounts factory installed.

2nd To have the pre-bent coiled nose gear already factory installed onto the firewall.

1st To have pushrods factory installed.

1st In the hobby industry to utilize sophisticated, very costly foam tooling that allows a slick shiney finish and more important, no foam flash around the molded parts.

1st To have a foam kit complete with an aluminum dural landing gear.

Introducing the best thing ■ happen to radio control since the a.r.f.'s . . .

The CESSNA 150 is designed for sport flying fun with true stability and is rugged enough to take the hard knocks any novice might inflict upon it at the local flying site. It features factory installed pushrods, first quality foam molded one piece Cessna 150 wing, fuselage, fin, and stab. Aluminum motor mounts, aluminum main landing gear, pre-bent coiled nosegear, horns and hinges. Firewall is factory installed + full size plans.

SPAN- 45.5 INCHES
AREA- 315 SQ. INCHES
WEIGHT- 18 OUNCES (without radio)
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COMPLETE HARDWARE PACKAGE: • ¼" wing hold ■ dowels for easy fit into factory drilled holes ■ fuselage. ■ two 6/32X1" bolts and four 6/32" hex nuts • four self tapping 440X3/8" motor mts. ■ • all hinges • all pushrod hardware • elevator connector and horn ■ four no.4-x½ landing gear hold-on sheet metal screws • hardwood ■ rails • four blind mting. nuts (installed) for motor mts. • full set die cut special vinyl windows • registration numbers printed on clear vinyl.
PLUS YOU GET: • full ■ highly detailed easy to read plans • foam finishing instructions ■ fuselage pre-assembled at factory • ■ piece fulsize wing • factory installed landing gear blocks • factory installed cabin floor.

SUPER VALUE CESSNA 150
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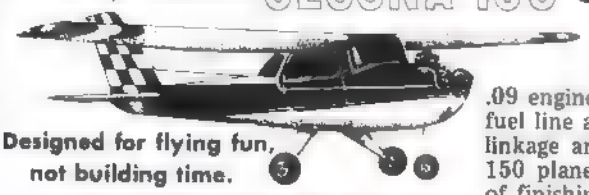

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3CH./2servos (dry) .09 std. med. engine.
$139.99

TOTAL PAK
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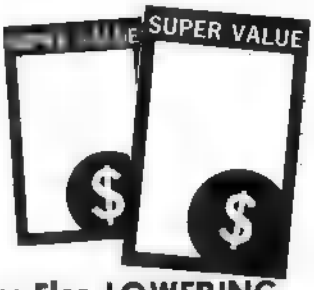

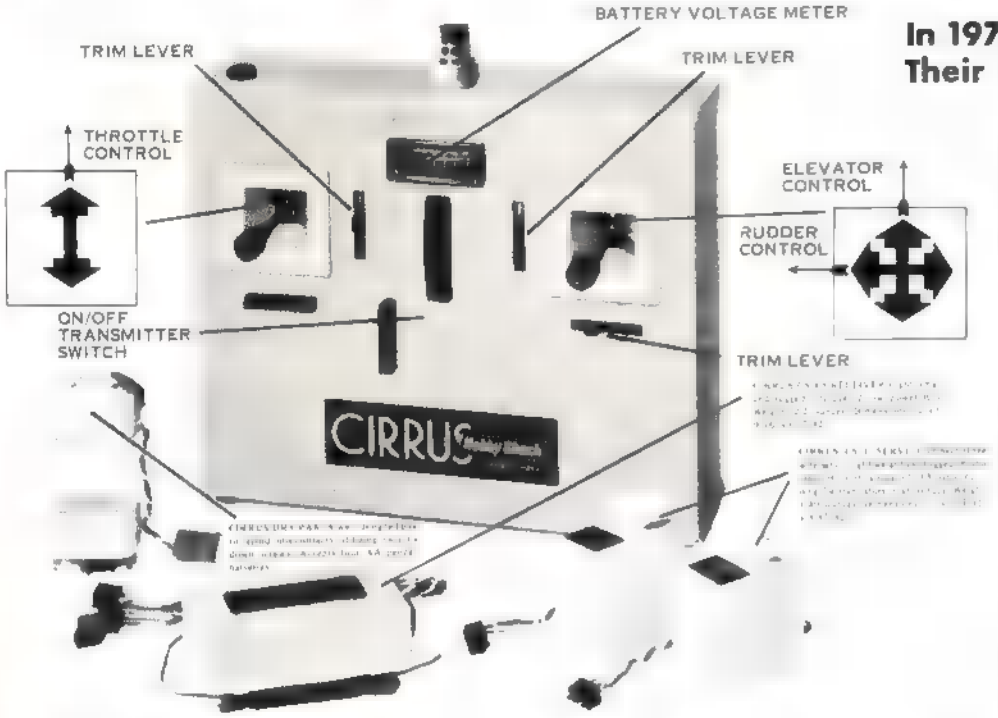

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Not only do you get all this for our special introductory offer of $89.99*, but we also changed the color to a rich black case with thromed gimbals — like an expensive camera you'll be proud to show off your new Cirrus equipment.

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HOBBY SHACK CIRRUS SPORT THREE INCLUDES / 3 CHANNEL RECEIVER, 3 CHANNEL (DRY) TRANSMITTER, / 2 SERVOS, DRY AIRBOURNE BATTERY PACK, SWITCH HARNESS, SERVO TRAYS AND FREQUENCY FLAG.

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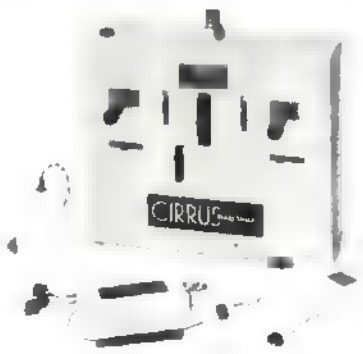

$139.99 for a full four channel all ni-cad system with 2 servos has to be one of the best genuine bargins anywhere! Compare our price with the "dry" 3 channels on todays market! Plus, with the addition of two more servos, you can have a full four channel system. And, you get our new 180 day warranty on free parts and labor. And if you should crash due to pilot error, our 3 month warranty allows you half price on labor, and a full 25% discount on parts.

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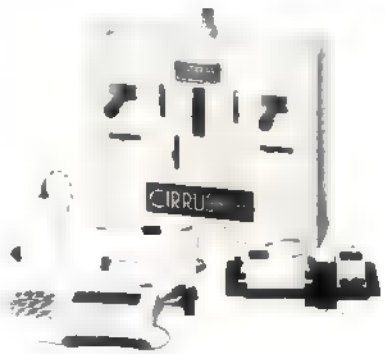

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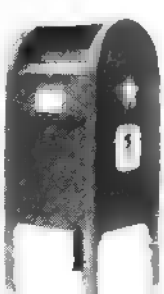

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where the action is

BOB VIOLETT ON PYLON
THE GOLDEN AGE OF MODEL AIR RACING

As your guest editor this month, I would like to share with you my views of where we are in this exciting sport of Pylon Racing. With the adrenalin still flowing from the 1974 NMPRA Tournament of Champions, from which I have just returned, I feel qualified to try to communicate the enthusiasm such an event stirs among those who participate.

I have often asked myself why we devote so much time and talent to something that the rest of the sporting world hardly recognizes. The enthusiasm can sometimes be lost over the long winter months of arduous building. But, for me, I must reflect on the feeling of exuberance experienced during a close and fast race.

Struggling through the FAI event at the fly-off, Cliff Telford and I questioned each other about why we were there, instead of at home with the family on the Thanksgiving weekend.

Well, the first big heat of the Form I event answered the question. Jim Maki and I had a hell of a race which neither of us won. . .but the planes and horsepower were evenly matched. The thrill was trying to outfly each other.

What it boils down to is that it's just plain "fun" to race these machines against each other. The type of people involved are the greatest group I have been associated with, resulting in a *camaraderie* that is every bit as important to such a gathering as the event itself.

To us, this is the greatest spectacle in model aviation. As the title implies, I think that we are at a plateau of sophistication. It's this pinnacle of the thrills of fast competition of which we should be very protective.

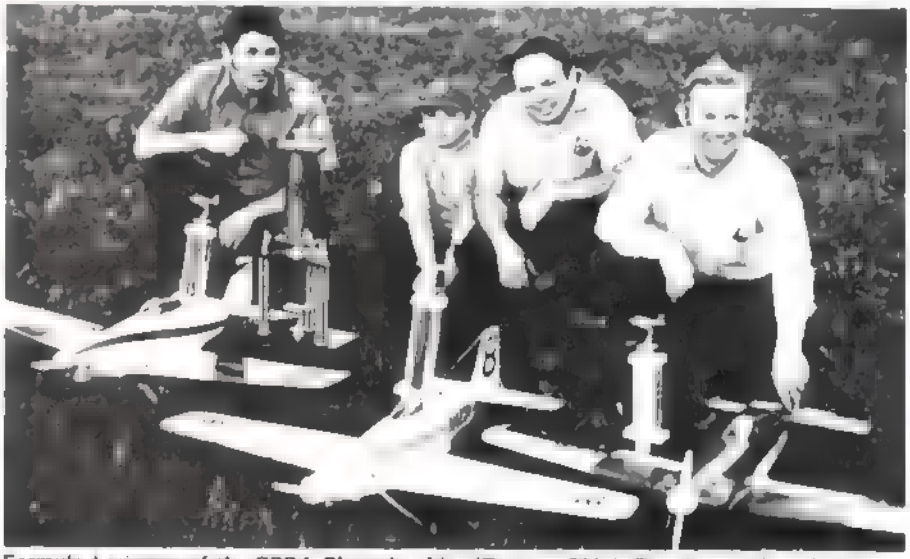
There has been much concern about the future of the FAI event in this country. The rest of the modeling world digs FAI because that's all they have. There is just no comparison when you see the same events back to back, such as at the Championships. Even an uninformed spectator has no trouble deciding which event he would rather see. The noise, the beautiful airplanes, the speed (yes, I said *speed*) are what turn him on, too.

Most contestants in the FAI event look at it as a way of warming up your thumbs for real racing. We could do that just as well with a bunch of Quickie 500s with half the effort of building the model.

As a demonstration of this point, at the last Pylon World Champs in Lakehurst, N.J., we hustled the FAI Bob Cat around the course on 60% nitro for a 1:21. If a vote could have been held on the spot, most of the European competitors would have adopted our Form I event right then and there.

We, the Form I fliers, are the prima donnas of the model airplane world, operating the fastest, most sophisticated machines yet developed, so let's have our event as we want it—the rest of the world will wake up and follow us eventually.

One final point about the FAI. How about the World Record (213 mph) the Russians are supposed to hold? That turkey we saw photos of wouldn't stay one lap with our Formula I hot dogs; yet, the FAI, in its brilliance, ac-



Formula I winners of the OPRA Championships (Dayton, Ohio). Dave Brown (right) finished third, Gary Villard and son took it all, while Bill Hager was second. All flew low-wing Minnows.

Joe Foster, designer of the LR-1A. Joe was 1967 National Champ. A prolific designer, he has created the Rivets, El Bandito, Shoshonik and Shark (a new design every year!).

The bigwigs of the Chicago Pylon Club show some of their wares. Bruce Balko (left) is the club's new CD. Frank Morosky (President) holds his son Miss DARA, and Jim Browning functions as the Vice-President.

cepted that garbage of a dossier ■ ■ Official World Record. How can you play that game?

Earlier, I mentioned protecting our event. To me, the best way to safeguard our sport from governmental intervention, slow-'em-down crybabies, AMA bureaucrats, etc., is to initi- ■ our *own* safety program, and actively police ourselves in complying with good, common-sense rules. I'll throw out a few ideas for discussion now, but, hopefully, they can be acted on before the next ■■■ starts.

(1) A cut inside number 2 or 3 pylons, below the tops of the pylons, should constitute zero for that race (Nobody wants to completely lose his head over this sport).

(2) No power-on, high-speed dives or maneuvers shall be performed after the race is complete. These are the purest machines, for racing only. To tear a wing off after a race, exposing others to injury, is not in our best interest.

(3) Formally propose no landing between number 2 and 3 pylons.

(4) Protective barricades for all course personnel should be used at all pylon meets.

(5) Black flag, and direct to land immediately, any aircraft that is noticeably fluttering or experiencing control problems. This is already a printed procedure, but I have never seen it enforced.

At the risk of controversy, how about this one?:

(6) Raise the minimum weight to 5¼ lb. Allow me to elaborate before you get upset. The increased speed we ■■ enjoying as ■ result of engine and pipe technology, is upping the G forces considerably. Right now, modelers are using too light a grade of balsa wing skins, or, in the case of plywood, sanding off one ply to keep the model down to the present minimum. The additional weight of the pipe, heavier engines, larger fuel tanks, and the ever-increasing demand for ■ mirror finish are all bearing heavily on the wing and stabilizer. To encourage the competitor in this direction (that is, to put the additional weight into airframe strength), how about a $25.00 mandatory donation to the NMPRA slush fund for any structural failure that results in a crash during competition?

We must be constantly aware that a fatal injury could relegate us all to the sport fliers' scene, not that it's any safer, but I'm sure regulatory powers would see it that way.

There was something initiated at the Championships that seems to have a lot of merit, if we are to continue to look on this sport as fun. . ."Grudge Racing." Quite simply, it means racing anyone you want to after official racing is concluded. Several heats were scheduled, with participants known well before the end of the contest, so the program could be announced and preparations made. The participants bought lunch for the course officials in appreciation of their extra effort. The race that ensued among Jim Martin (convert from Pattern), Jim Maki (Florida Flash) and I was, perhaps, the most exciting 10 laps of the three-day meet. The officials enjoyed it, the spectators loved it, and I certainly enjoyed the friendly wager. There was even a little side-betting among the pylon officials. After looking at us for three days, they no doubt had their favorites.

This type of extra attraction serves various purposes. At the conclusion of the official races, there is really only one guy who is happy about the outcome. The rest of us must have something satisfying to talk about on the way home. A friendly wager, ■ personal grudge, a rematch of an unsatisfactorily scheduled heat—all can be settled this way, and everyone involved ■■ enjoy it. It truly adds to the "fun" aspect of such a gathering.

Allow ■■ to agree with Cliff Weirick's multiple class of Form ■ racing. Whatever the finalized rules are, they should be designed to let the *most* people get the *most* out of racing with the minimum of administrative difficulties. Let's be honest with ourselves, some of us ■■ handle the "teen machine" and some of us can't, but ■■ all enjoy racing against our peers.

Time limitations, experience, and perhaps economics determine how fast we ■■ go, but they should not necessarily limit the fun ■■ can have racing.

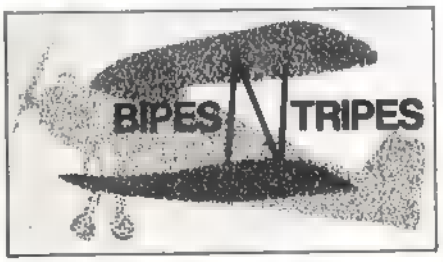
I think that our 1975 NATS and Tournament of Champions should be programmed around this concept. Let's get the most Formula 1 airplanes and pilots possible, enjoy the greatest number of heats possible, and award the largest number of trophies possible.

Let's look for ■■ avenues of promotion. ■■ have ■ spectator sport with all the necessary ingredients. It could be developed into something ■■ representative to model aviation as the Indianapolis "500" is to the automotive industry.

Modest cash prizes for as many competitors as possible would certainly be welcome. Some spend thousands of dollars yearly on equipment and travel expenses. Since most forms of auto racing offer cash awards, why can't we? To avoid problems ■■■ money and endangering our sporting atmosphere, keep the cash differential between places ■■ small ■■ possible. Example: $1,000.00 purse; first place, $300.00, second, $250.00, third, $200.00, fourth, $150.00, fifth, $100.00. Surely we could handle this professionally.

The efforts of Jim Maki, Bill Williamson and the Tropic Aeros R/C club are representative of what can be done to stage a super-race; it's truly a well-organized fun gathering that has set a standard from which we should not regress.

With the off-season upon us, we are rebuilding, creating and trying to better our 1974 performance. Perhaps a little effort also should be spent trying to improve our sport, help our organization and keep it safe. We should do all we can to preserve this, the "Golden Age."



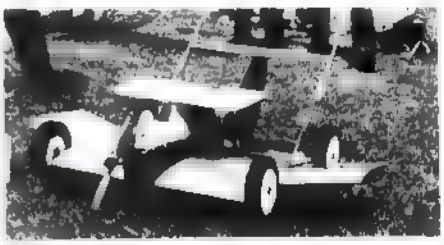
O.L. (OLIE) OLSON ON MULTI-WINGED RC THINGS

I was sitting at the typewriter the other day, staring out the window at the snowflakes drifting by (awaiting inspiration for this column), and wishing that I was anywhere but Nebraska in mid-winter. My mind wandered back to '71—the year of Omaha's great Triplane Regatta. I decided, right then and there, that (ready or not) it ■■ time the rest of the world heard about it. . .

My old Swedish grandfather once said, "Kid" (He always called me kid. He couldn't remember my name.) "Kid," he said, "remember this—if you can't do it better, at least you can do it first." As a direct result of this sage advice, the world's first Triplane Regattas were held right here in the Biplane Capital of the World, 30 years later.

They weren't the greatest thing since sex (in fact, they really didn't prove much of anything at all), but they *were* a lot of fun, and that's the name of the game.

We used Fred Reese's Sopwith tripe design, which later appeared in *RCM* (January, 1972, issue). With a little bit of modification, ■■ also had Fokker DRs at no extra cost. Our fun-loving group burned up the pylons (20 mph) for most of the season with these squirrelly but stable, 15-powered, cartoon jobs. If they look like fun to you, too, drop friend Tom Runge (at Ace RC) ■ note. He could supply the wings and cowls, I betcha.



No cutting remarks about Ted Teisler's well-trimmed project, please. Such a machine could, mowerover, lead to lots of puns. This grass-roots design is really a bipe in disguise.

A trim ship: Speaking of firsts, we have ■ new one in our RC fraternity that really *does* rate a first-class hurrah, bravo, and all sorts of similar adjectives. Ted Teisler of La Grange, Ill., has come up with the world's first flying lawn mower. It's really ■ short coupled Bipe in disguise. . .but what ■ marvelous disguise. According to Ted, the 7 lb., 60-powered, foam and balsa ship is quite stable and performs very well. Congratulations, Ted.

Shazam: Hey, guys! It's "Shazam" time! In case you've forgotten, or missed, last month's episode, the Shazam (with the Lord's approval) is going to be the world's first Bipe trainer. We don't mean a trainer with which to learn to fly Bipes, but rather, an RC trainer with two wings for learning to fly—period.

We are after ■ ship that responds as slowly as the novice pilot, recovers faster than he can, and won't get him into too much trouble. We want a structure which is light; reasonably simple; foolproof to build; and strudy enough to withstand unflaired landings, or even a ground loop or two. We hope to keep the cost, size and flying speed down; and the appearance and performance *up*. Are we going to do it? Only time will tell. But even if ■■ don't, we'll still have a first. The first fully documented and admitted failure to appear in AAM. (We should be so lucky!—*php*.)

The first step in the development of any original design, whether it be an RC ship, ■ baby buggy, or a plow, is to ignore the first idea. One should sneak up on something that is going to possess a little originality, and, perhaps, some value to the rest of the folk. Goals, design philosophies, and the concepts to implement them need time to jell. It's much easier to think, visualize, change one's mind and think again; then charge right in with T-square, pencil and giant eraser. Plans take planning too. The goals set forth for the

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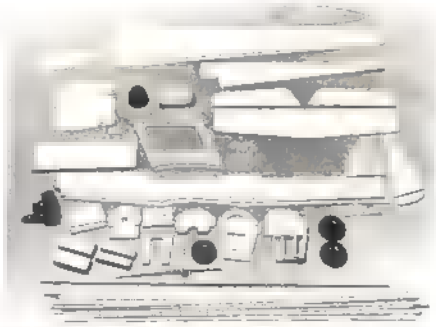
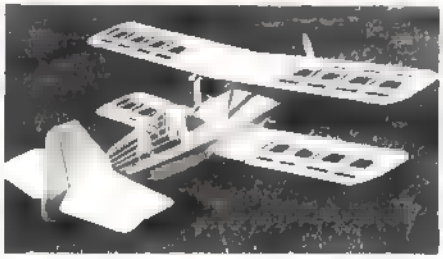


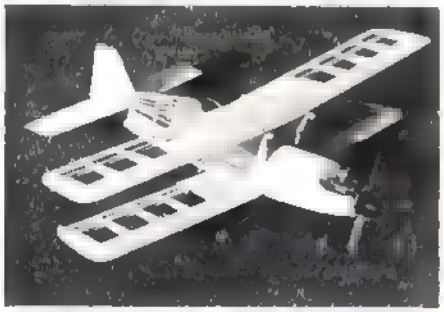
Just add a little glue and, Shazam!, you've got a bipe trainer. *(Photo by Larry Quigley)*



Shazam were laid out, for the world to see, in the last paragraph of February's **AAM**. The major design concepts follow.

Size: 700" sq. of wing area, 4½ to 5 lb. gross weight, 35-40 engine. We want an airplane large enough for good visual orientation in the air, a light wing loading, and a respectable Reynold's number. We also want to keep it as small as practical for economy's sake—lower costs for engine, material and fuel.

Wings: NACA 2412 section; no sweep; generous amounts of dihedral, gap, and stagger (3°, 8", 2½"); 2° positive decalage between wings. We would like to have a large dose of longitudinal and lateral stability built into the Shazam—both static and dynamic. We are going to demand good slow-flight capabilities, with a stall difficult, if not impossible, to achieve; and lateral control available to the minimum airspeeds.

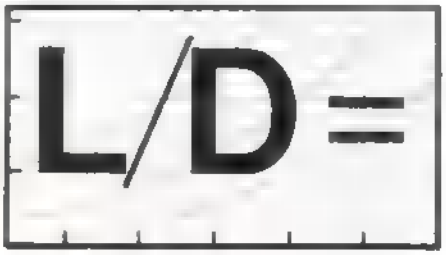


A bipe for the rank beginner. Good flight characteristics are expected from the Shazam. *(Photo by Larry Quigley)*

Fuselage and Empannage: Forward positioning of CG with 2° and 4° decalage between wings and horizontal stabilizer. Somewhat excessive stabilizer areas, plus definite rearward location of the center lateral area. These are additional efforts to achieve a maximum amount of inherent stability.

General: Short trike gear to facilitate ground handling, takeoffs and landings. Lightweight wing panels and tail surfaces, in order to keep the moments of inertia of the ship about all axes to a minimum. Keep the CG as low as possible, build in a tad of right thrust and we've done about all we need to for the sake of stability.

That ought to be just about enough heavy stuff for one month. We'll take a little closer look at the structural considerations of the Shazam when we meet again. Till then, comrades, on with the Revolution (Biplane, that is). Don't forget, most good things come in pairs.



DRAG REDUCTION TECHNIQUES (2)

BY ERIC LISTER

Last month we showed the payoffs in endurance time, range and speed for powered and unpowered ships that could be obtained by increasing the L/D ratio of a design through drag reductions. This month we'll explain the types of drag a plane can encounter. I'll do it this way, rather than leap right into design techniques, so that you'll get a better idea of what makes up drag. This should help you fight it yourself, either at the building board or when selecting a kitted design.

Although there are dozens of specific items on a plane that pick up drag, they fall into two main categories: drag due to shape and drag due to lift. Drag due to lift will be shown to be reasonably straightforward, but drag due to shape is a real bear. It's at least half of the total drag.

Drag due to shape comes from two sources: friction, and flow separation. These are the two basic mechanisms. Friction drag comes from just what the name implies—the friction between the air and the plane moving through it. Separation drag comes from the fact that, anytime you ask the airflow over the model to slow down or fill a hole, it usually pops away from the skin and leaves a sort of aerodynamic hole. Places where flow separation can easily occur are just aft of the max thickness/camber point on an airfoil, behind a thick trailing edge, behind a wing root where the wing suddenly ends, at control surface slots, and behind a plane whose tail end does not come to a gradual point.

Tin can of Tiburon ventures into Oz.

In each of the above examples, the basic shape is beginning to get smaller and trying to come to an end. The trick is to not make it shrink or end too suddenly. If the flow cannot hang in there close to the wall, it pops off. After a little distance however, the flow kind of remembers that there's a hole back there and some portions of the rearward moving air actually stop, *reverse their direction and start going upstream*. This is something like turning on thrust reversers—it produces a lot of drag. The mechanism, of course, isn't anywhere near as strong as a thrust reverser; but, in a model, a very large portion of the drag comes from flow separation, which causes flow reversal.

For what it's worth, in full-scale, turbo fan aircraft, flow separation off the back end can be one heck of a problem in getting good cruise performance from a plane that has the exhaust nozzles at the aft end of the fuselage.

There, the problem is the same mechanism discussed above, and is due to the basic problem of: How do you end the tail end of the body? The WWII prop-driven Corsair and Zero didn't have to contend with exhaust nozzle shapes. Both aircraft were top-notch, and actually came to a point in the back end.

The full-scale problem is mentioned here because of the recent introduction of fan-powered model "jet" engines. While all the tests and development changes in full scale are not yet completed, for the modeler using these units, if the problem develops, the fix may be either pod engine mounts, or keeping the nozzles in a twin installation as far apart as possible. Time will tell.

So much for separation drag. The last basic type of drag is due to lift, and is called induced drag. In full scale, the best L/D ratio of the airplane (flattest glide, longest range) occurs at the angle of attack where this drag is just half the total drag of the whole airplane. In a model, it's sometimes impossible to get the lift up high enough to do this, because the drag due to shape (which I'll call profile drag) is so high, owing to small sizes. We'll get into the bad effects of small size in a minute. The induced drag coefficient, $Cx^2/3AR$, varies with the square of the lift coefficient (three times the lift means nine times the induced drag) and decreases on a 1:1 percentage basis with increasing aspect ratio in the wing (double the aspect ratio means half the induced drag).

Three more concepts are needed before we'll be ready to start looking at how to analyze and handle the drag demon we started out to kill last month. These three concepts are laminar boundary layers, turbulent boundary layers and the thing people call Reynold's number. These concepts are needed if you want to understand why it is sometimes worthwhile to trade off small increases in friction drag for large reductions in profile drag (reduced separation) and why very high aspect ratios through small chord lengths don't always pay off in a model.

Okay, a laminar boundary layer means that the flow right next to the surface is actually very orderly and layered, with no exchange of air particles from one layer to the next. Right next to the skin, the layer

(Continued on page 68)

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GDA-405-A Single-Stick Transmitter — Provides one-hand, simultaneous control of three independent channels. The stick's gimbal coupling actuates two functions, while the third is controlled by the return-to-center knob on top of the stick.

GDA-405-D Dual-Stick Transmitter — Two-hand control of four independent channels. Friction adjustment removes tension from one function of each stick to maintain the control at any position you set.

Both transmitters have the same versatile features — trim-adjust tabs, relative power meter, two-position switch for landing gear, finger-adjust tabs for auxiliary functions, coin-switch selection of two adjacent channels (except when 75.640 is specified), trainer link, servo travel adjustments for each channel. Simultaneously recharges transmitter and receiver batteries.

The lightweight receiver weighs in at just 2.5 ounces. For convenience, it has a plug-in connector block to simplify battery and servo hookups, an external on/off switch and two-channel frequency selector.

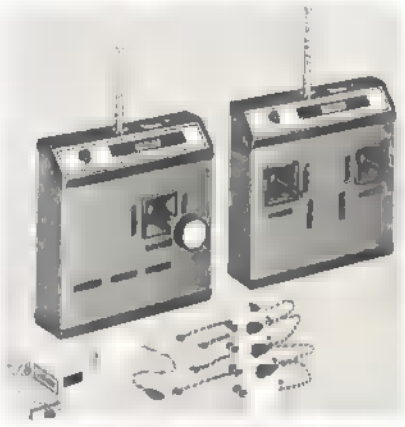
And, like all Heathkit products, the transmitters and receiver are amazingly easy to assemble, following the illustrated, step-by-step instructions. Even a novice can enjoy building them — and everyone will enjoy the savings.

Kit GDA-405-S, Single Stick Transmitter, was 144.95 ..... **Sale 109.95***

Kit GDA-405-D, Dual Stick Transmitter, was 124.95 ..... **Sale 99.95***

GDA-405-2, Receiver, was 59.95 .. **Sale 49.95***

Save Even More ...When You Buy A System



The systems include your choice of single-stick or dual-stick 8-channel transmitters, the GDA-405-2 receiver with the GDA-405-3 battery pack and your choice of 4 servos (GDA-505-44, subminiature or GDA-405-44, miniature). And all systems include all batteries — a retail value worth up to $39.

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actually is being pulled along by the model. A fraction of an inch out from the skin, the air is merely bumped aside as the model passes, and then returns to its relaxed state. Drag caused by shearing one laminar layer against the other is quite low (laminar friction drag as compared to a turbulent boundary layer). A laminar boundary layer, however, is sort of lazy and does not like to fill in aerodynamic holes—it separates easily, remember that.

A turbulent boundary layer is kind of lively and very disorderly, with no layers—just a hodgepodge of churning air. Right at the skin, all this churning tends to make the turbulent friction drag about double the value for laminar friction drag. The nice thing about the turbulent boundary layer though, is that since it is so lively, it does not separate easily as a laminar layer does. If separation does occur, whether it's laminar or turbulent, the layer will usually re-attach downstream. The turbulent laminar layer will do much and loses much less "Pzazz" than the laminar layer does, with much less flow—and, a result *much less drag*. In a model, we'll be looking for turbulent boundary layers and will use "trippers" and rough surface finishes at times, which is the of practice for drag reductions in full scale in many, many cases.

The last topic is Reynold's number (RN), which is the only way I know to tie in scale effects. The Reynold's number is the ratio of inertia viscous forces a body feels. That doesn't mean too much to the modeler, until I tell you that for at level the equals 6380 airspeed (ft./sec.) body length (ft.), *and* that those shape drags I mentioned extremely dependent upon the RN. The effect, in general, is that the RN is increased, the profile drag coefficient (due to friction and separation) starts to get smaller. Flow at low RN (small chord or low airspeed —light wing loading) can be predominantly laminar the boundary layer, which may be bad news. Flow higher RN (larger chord or higher airspeed—higher wing loading) can start to become turbulent in the boundary layer, which may be good news.

The important peculiarity of the RN effect is that: (1) at some "critical" value the flow starts to switch from laminar to turbulent and the profile drag coefficient begins to drop rather sharply; and (2) since the flow mechanism that makes this happen is the generation of a turbulent boundary layer, sometimes you can fake out the flow with turbulence-generating devices that make the model act like it's operating at higher RN. This effect is so strong that when engineers are measuring drag in wind tunnels, calibration measurement must be made to determine upstream turbulence due to screens and guide in the tunnel. Without it, the effective RN can be two or three times higher than what the airfoil would feel in the free atmosphere. The result is that you start reporting drag coefficients for models that are considerably optimistic at low RN, unless there some effort made to correct for this. Later in this series, when we start getting into real drag analysis, the RN data our disposal have been corrected for this.

Before we leave it for this month, I'd like to get a little headstart on of next month's messages—in a sailplane, bigness is goodness. The photo on page 66 is of a 15-ft. span semi-scale Libelle, designed and built by A. Hartwell Jewell, Tiburon, Calif. Aspect ratio is 23.6:1, airfoil NACA 4412, wing loading 21 oz./ft.^{2}. Designed apparently from my SDH, Dr. Jewell says it "works very well." Nice looking airplane. Looks to me like "Oz didn't give nothin' to the Tin Man that he didn't already have." Lot of original structural features in Jewell's big jewel.

CLAUDE McCULLOUGH ON RC

Resurrect A Rare Bird—II: Those Navy planes of the '20s and '30s, with colorful markings and a wealth of details, have a certain something that gets a scale builder where he lives. The Martin T4M is one that seems to have been crowded out of the spotlight given to Curtiss, Grumman and Boeing pursuits of the period. There were 102 built by Martin and, when production later taken over by Great Lakes, 18 TG-1s and 24 of an improved version (called TG-2) were added to the fleet. For many years, these big, 53-ft. span brutes were the backbone of the torpedo squadrons.

If three open cockpits sounds like too much detailing, fear not, for they were pretty Spartan affairs. The pilot's panel had about a dozen instruments. And dig that Barney Old-

field-style steering wheel, wrapped with cloth. Those stirrup-type rudder pedals were bor-

This month's rare bird, the Martin T4M.

rowed right off a saddle. The exposed Pratt and Whitney will post no construction problem, thanks to Williams Bros. engine cylinders. The slab-sided fuselage and constant chord wing will be easy to build. Big tail and general layout makes it a cinch for good stable flying qualities. The prototype still had effective aileron reaction ■ 36 mph!

So many bipes have odd ball landing gear configurations, which split between fuselage and wing mounting, making it hard to disassemble the model. Not so the Martin. The wing-mounted gear can be installed in the usual low-wing type grooved torsion bar block to take all kinds of shock without bending. Incidentally, in case you haven't discovered it, the secret of good ground handling characteristics with a two wheel gear is to have it close to the CG. The farther ahead it is, the more squirrelly it is likely to be, and the harder it is to feed in corrections that will do any good. This being the case, the Martin shouldn't be a ground looper.

For once, a really great three-view can ■ had for ■ nearly forgotten design. Paul Matt featured it in his *Historical Aviation Album* (Vol. IV) with pictures and history. This book may no longer ■ in print, but blueprints of his detailed drawings, showing colors and markings, are always available in two 17 x 22" sheets for $1.75 from HAA (Box 33, Temple City, Calif. 91780).

The National Archives has a lot of photos, including cockpits, landing gear, machine gun ring and torpedo mounting. Send ■ a self-addressed, stamped envelope at Box 40, Montezuma, Iowa 50171, and I'll supply ■ copy of the photo list.

So get out of the rut and put this impressive silhouette into a contest. Impress them with low fly-by to launch the big torpedo, while the rear gunner draws a bead ■ the scale judges with his twin Lewis guns.

Scale Data Sources: Scale builders who write to aircraft companies requesting three-views of their products get mixed receptions. Some outfits consign all such letters to the round file. Others have plans available for their current or recent production that they will send out, but won't dig into their blueprint tracing files to furnish older types.

ERRATUM

Whitney's Power Box (December Checklist, page 57) was incorrectly priced. The correct price ■ $21.95.

Your ideas, hints, photos, contest results, etc. are worth $5.00 when published in Where the Action Is. Send them, c/o the appropriate WTA! columnist, to **American Aircraft Modeler**, *249 Freeport Blvd., Reno, Nevada 89510.*

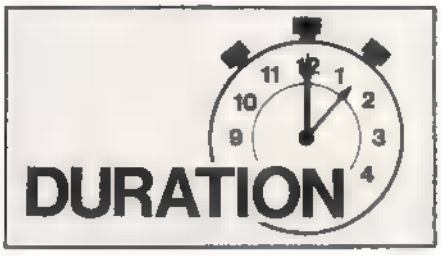
Walt Burgin's ½"-1 ft. B-36, as flown ■ the '71 NATS. Walt, where ■ you? Someone wants to build your model.

A friend who is ■ employee of ■ major company told me that many letters from model builders are received, and that answering them and furnishing material absorbs a lot ot time and money. Any serious builders would be glad to pay the costs just to get authentic material but, since there generally ■ no program for pricing or receiving payment in the historical departments of most companies, offering to pay usually does little good.

Considering this situation, the Boeing Co. Historical Division offers a valuable aid to scale buffs. They have produced ■ series of plans of Boeing airplanes especially for model builders, with cross sections, details and some markings. These are available at reasonable prices, ranging from $.20 to $2.00. Some

(Continued on page 70)

types are offered in as many as five different scales. For a list of the plans, send a self-addressed, stamped envelope to: Historical Services, Orgn. 4-8540, Mail Stop 11-24, The Boeing Co., P. O. Box 3707, Seattle, Wash. 98124.



CARL MARONEY ON SOARING

NSS News: The Annual Board of Directors' Meeting of the National Soaring Society (NSS) was held in Silver Spring, Md., Nov. 25-26, 1974. Newly elected directors attending were Bill Wargo, District I; Don Goughnour, District III; Chuck Anderson, District V; Otto Heithecker, District VII; and Rod Smith, District X. Following are highlights of the 18 hours of formal meetings:

The NSS has formally proposed to AMA that a Standard Class sailplane be established with the only limitations being the 100" or less projected wingspan in flight. This will apply to the NSS '75 Contest Season.

NSS recommended that the AMA *reject* proposal RC-76-19 which would establish two divisions of the Standard Class.

NSS recommended that the AMA *reject* proposal RC-76-16 for the establishment of proficiency classes for sailplane competition.

The new NSS President, Rod Smith (left) accepts an award from Dan Pruss at the '74 S.O.A.R. Nats.

NSS recommended that AMA accept Task IIA Provisional as an official AMA event in lieu of the current Task IIA. (This will eliminate the 3-min. grace period previously allowed.)

NSS recommended deletion of FAI reference to the Task I event thus approving proposal RC-76-18.

It was recommended that the "RC Scale Sailplane Competition Rules" for NSS be accepted, replacing the current AMA Scale Provisional Rules, RC-42, and in lieu of proposal SC-76-36.

This proposal is a major accomplishment of the NSS Scale Rules Committee, chaired by Lee Renaud, and consisting of Dennis Hall, Gordon Pearson and Carl Lorber.

John Worth, AMA Executive Director, presented information pertaining to the 1974 AMA Nationals Soaring site at McNeese University, Louisiana. [illegible] will run the soaring event at the 1975 AMA Nationals. AMA will provide the site, facilities, winches and administrative assistance.

SOAR will host the 1975 S.O.A.R. Nationals. This is in response to a questionnaire indicating that 95% of contestants want a separate Soaring Nationals.

A new NSS emblem is in the final design stage by Bob Lopshire.

Awards for the 1974 contest season will be presented as follows:

(a) To the first 10 places in Open age, and (b) to the first three places in Junior-Senior ages.

The NSS awards banquet will be a part of the S.O.A.R. Nationals banquet.

A new "National Awards Program" was established. This system will be maintained by the individual contestant and will count the *best four* of the *first six* contests flown by the contestant. Otto Heithecker will administer the program for the 1975 season. Separate systems will be established for Thermal and Slope Soaring.

A Successful Mistake: Donald Musante, stationed in Germany, dropped us a line recently. Listen to his story:

"I have been looking about for an all-around glider to bring back to the States with me. I did remember about the Cumulus being a very versatile craft so, after some deliberation, I purchased one. I test flew it from a short hi-start with about 400 ft. of line; however, its still air time without washout in the tips was low. I decided to put washout into the tips and I used German balsa wood to support the tips while drying. After it was dry, I noticed that I had more than 1/4" per panel (stupid, you may think). Actually it

(Continued on page 72)

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Dear Pro Line Distributors, Dealers and R/C Fliers:

We would like to take this opportunity to thank all of you for contributing to the most successful year in our history.

To our distributors who have contributed materially to our accomplishments, and to our dealers who are the keystone of our success, we pledge that traditional Pro Line quality and service will be maintained in the future so that you can, with assurance, deliver to your customer the finest equipment available.

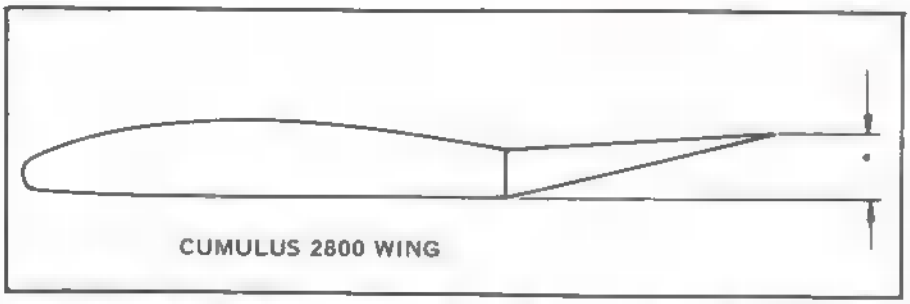
To all fliers--no matter whose equipment you are flying--we hope that this sport gives to you the rewards which should be yours from this most satisfying of all hobbies.

Last, but certainly not least, we want to thank our competitors who in this day of shortages have assisted us in the true spirit of the Radio Control Hobby Industry.

Joe Major, Sr.

Jim Fosgate

Jim Fosgate



CUMULUS 2800 WING

worked out quite well. The total washout was about 3/8" ■ 1/2".

"Following this modification I finished my second 30-min. thermal flight for Level III LSF requirements. I personally don't know for ■ fact that its flight performance is hurt by this; however, I think that it helps by quite a bit. As a matter of fact, I have picked up thermals a lot lower than 30 ft. with this glider. Aerodynamically, it may have something to do with the twisted wing effect, be- ■ it seems easier to notice thermal activity with this modification. I would advise anyone who has ■ Cumulus 2800 ■ put this washout into it. It definitely helps."

Almost LSF Chapter: The LSF is growing steadily in Europe due to the support and efforts of Dr. Walt Good, during his two-year assignment for the Applied Physics Laboratory, Johns Hopkins University, at their field office in Germany. Walt has been instrumental in establishing seven coordinators from various countries in Europe to work toward starting national chapters. To date, Germany has 11 LSF members and may be the first European country to reach 15 members, which is the number required to form ■ National Chapter of the LSF.

In a recent letter, Walt went on to say that Italy's LSF Coordinator, Ferdi Gale, has had three surgical operations this year and is now recovering and anxious to get back to LSF duties. In Holland, Cor Burger, an early LSF pioneer, has passed the LSF Coordinator job ■ to Paul Schoorel, who is ■ active RCer from Groningen, Holland.

Norway now has Jacob Arnekleiv (LSF 900) as National LSF Coordinator. He helped many LSF aspirants at Pellestova in June, and agreed to be the first Norwegian Coordinator. Sweden's Coordinator Jan Levenstam also ■ at Pellestova. Although heavily involved with helicopters, he still is active with gliders and the LSF.

From England, Tom Patrick has responded enthusiastically to covering the United Kingdom for LSF. This includes England, Scotland, Wales and Northern Ireland. Flying his favorite glider, Patrick has logged 450 flights.

Wolfgang Schlueter wrings out his 2000 mm span aerobatic sailplane ■ the Danish coast. Wolfgang is the LSF representative in Germany.

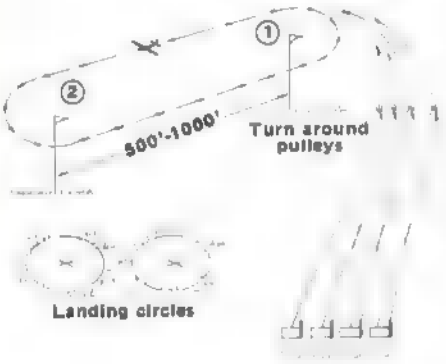
Finland has ■ new coordinator, Markku Rauff, who ■ very active and already has several new members. Rounding out the current staff is Wolfgang Schluter of Germany, another active modeler and frequent contribu- ■ on various subjects to the German *Model Magazine*.

Dr. Good, who returned early in January, will remain as the overall European Coordinator for LSF. Incidentally, should you be inter-

ested in attending the "Pellestova 1975" event, which is the big glider Fly-Together in Norway, you may get additional information by contacting the Norwegian LSF Coordinator, Jacob Arnekleiv, Boks 23, N-2660 Dombas, Norway. (A future issue of AAM will carry Walt's report on this phenomenal event—*php.*)

Sailplane—Vol. Four: In response to many requests for back issues of the *Sailplane*, the National Soaring Society (NSS) is offering all 1974 issues bound in an Accopress binder for only $4.95 (postpaid). Since this required a financial investment, only a limited number of these are available. All orders must have your personal check or money order attached, and should be forwarded to Clive Sadler, NSS Secretary, 46 Oak Crest Dr., Dover, Del. 19901.

The Provisional Distance Event: The "floater" type of sailplane is always enjoyable to fly, but a design that gives you more miles per foot is more enjoyable, according to Dick Beltz of Lehighton, Pa. Having a full-scale power and soaring background, and having competed in a couple of full-size soaring events with requirements to fly upwind legs,



PROVISIONAL DISTANCE EVENT

Beltz believes this shows that sailplanes with good L/D ratio have a definite advantage. To further the development of RC sailplane design in this area, Dick has taken an idea being flown by West Coasters, and added his own idea for a Closed Course Distance event.

The event will be won by the contestant who completes the most laps around the pylons. If a time of 5 min. were set, timing would start at release. Then the contestant would round pylon 1 and proceed to pylon 2, at which time he would head back to pylon 1. The 5-min. event would require at least a few turns in a good thermal, or possibly more. A longer event of 7-10 min. would make the event a little less chancy, but that would be up to the CD.

At the end of the time limit, the contestant would be scored on the legs completed, with partial scoring. A 50-point bonus, similar to 15 Min. Cumulative, would make it worthwhile for the contestant not to land on course, but in the circle. If each leg were scored 50 points, a good flight of five round trips, plus the circle, would equal 1550 pts. The CD could vary length of the legs and also the time limit of the event.

Duration Record Official: After several months of red tape, followed by a lack of communication, we have just learned that the disputed Russian glider duration record of 25 hours, 44 min. 8 sec. is now official. The record set between Sept. 30 and Oct. 1, 1973, by V. Myakinine. This record also is a absolute record, meaning it's the highest level achieved, regardless of model type (*i.e.*, RC, CL or FF). Interesting to note here is that the USSR presently holds three of the four absolute records, leaving only Maynard Hill's Altitude Record of 16,919 ft. in the U.S. It is unlikely that a glider will ever achieve the status of absolute altitude, as the current record is only just under 5000 feet—we must not forget Hill's record was done with a power model.

Octoberfest Slope Bash: *(from Cas Pels, AAM's Midwest Soaring Correspondent):* Question: Where does one find suitable slope sites in the Midwest area? Answer: Look and cast about, and ye shall find abundance thereof. And so it came to pass that sought these new horizons, we did encounter several, although not exactly in our backyard.

Slope soaring has at last encompassed a fairly large group of enthusiasts in the Midwest. This turn of events has been brought about by a few venturesome souls, who, for years, had enjoyed thermal hopping, but now longed for a change of pace.

The bluffs at Cudahy, Wisc., overlooking Lake Michigan, provided with many hours of pleasant flying, and it's all within an hour's drive from home base. At a thermal contest in

(Continued on page 74)

Cudahy, we met several members of the Madison Area Radio Control Society who spoke of a group of hills located near Lodi.

A date was set in October last year to meet in Madison and join them in a slope session. That event was named the First Annual Oktoberfest Slope Bash and was an instant success, thus prompting another such affair for the following year.

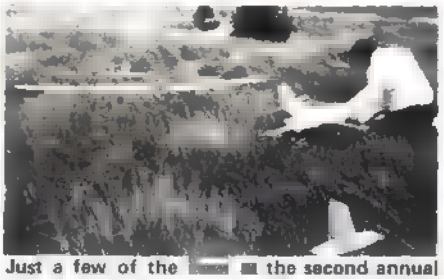
The time for the second annual Oktoberfest Slope Bash had arrived. Sunday, Oct. 6, at 5 a.m., the picture through the window was certainly bleak and gloomy.

Undaunted, a dozen or so SOAR members rendezvoused at the Des Plaines oasis at 7 a.m. Among the arrivals were Max "Grunau Baby" Geier, Doc "Schulgleiter" Hall, Dan Pruss and a defector from the East, Keith Finkenbeiner. Keith originally hails from New Jersey, but the glamour of SOAR lured him to give up his abode and take up residence near the hub of all soaring activities.

And so, in spite of the overcast and threatening skies, the motorcade cranked up and were off, with hopes the weather would clear. The further north the caravan progressed, the worse the weather, until finally it no longer threatened. . .it just poured, etc. Well, SOAR members are a hardy lot, and so we persevered. By the time the slope site slipped into view, the rain relented.

As we parked and started unloading, we discovered that two carloads of chickens had peeled off somewhere along the way, apparently disheartened.

Equipment was excitedly unpacked and divided among the party and the upward climb commenced, occasionally punctuated by the abrupt appearance of an evergreen tree in our paths. Miraculously, all survived the ordeal of ascent, and some time was allowed to pass for getting acclimated to the thin atmosphere. The only signs of life atop were the lower living forms, which have adapted to survive this hostile environment: lichen; highly specialized insects; and glider guiders. The latter were perhaps the most specialized of species, possessing incredible adaptability—the signs that indicate traits inherent in only the lowliest forms of life.(?)



Just a few of the more than the second annual Oktoberfest Slope Bash in Wisconsin. AAM's Editor was one of the first to auger-in here two years ago. (They had to remind me—*php*). *(Photo by Cas Pels)*

Ships were assembled, frequencies were checked for compatibility, and the first ships were chucked over the side. Usually, the shrewdest, most astute of the lot were content to sit and watch as these first brave souls explored the best areas of lift, areas of turbulence and, most important, areas presenting the least difficulty in landing.

When all this information was assimilated, the air suddenly became crowded. Some elected to head straight out into the valley, while others negotiated the immediate slope area. This graceful flitting back and forth somehow seemed to suggest an aerial ballet, as sailplanes pirouetted on wing tips at each turn and swooped past in a grand entrechat. Accompanied by Strauss waltz music in the background, one could easily be carried away with the ballet concept.

Doc Hall with his Gryphon off the bluffs in Cudahy, Wisc. *(Photo by Cas Pels)*

Survival of the fittest was soon admirably demonstrated as, in the ensuing hours, a careless ship was ensnared by turbulence and ruthlessly hurled into oblivon.

Although it was cool and overcast, everyone had some wild and woolly slope flying. Only one casualty to report and, as usual, the incident was preceded by those famous words, "just one more flight", uttered by Giulio Fornary of Racine. Giulio now knows that Hobie Hawks are not indestructible, as

(Continued on page 76)

GRADY HOWARD — CHOPPER ACE

SEZ "W.E. EXPERT SYSTEM GREAT IN SHARK"

Maybe you fly helicopters and maybe you don't. This advertisement has to do with radio performance; operation in a helicopter is part of this story. Our advertising photo (courtesy of Eric Wagoner) is of Grady Howard, Salisbury, N.C. Grady is undoubtedly among the top five helicopter people in the country. Both Dave Grey and Bentley of the Du-Bro team are flying an Expert Series in their helicopters at the time this advertisment is being written - December 3, 1974. Here is the story. About the end of October we made a change in our receiver. Probably the people most responsible for this receiver change are Jim Lanterman, Vice-President in charge of engineering, and Lew Penrod. Perhaps the change came about because of Lew's fussing at something in the receiver that just did not seem quite right to him. We do not care to discuss how we got from the old design to the new design but, anyway, we did make a change and the change resulted in:

1 It is our opinion that helicopters present the greatest challenge to R/C equipment manufacturers, particularly the larger helicopters where there is a lot of metal crashing around at all times. I do not know whether this is metal noise interference or reflected signals off the antenna, or what. Most people who fly helicopters agree that it is tougher to get a radio to work well in a helicopter than it is in a conventional airplane model. Grady Howard tells us that our Expert Series works terrific in his Du-Bro SHARK (pictured above). He tells us that he can now fly that chopper into a "restricted zone" that he was not able to fly in before. I am not real clear on what the term "restricted zone" means but I think Grady is telling me that this is a piece of geography in some state that always gave helicopters trouble. This morning, Dave Grey on the phone telling our Sales Manager, Paul Benkner, that he and Bob Bentley were off to Las Vegas for the CIRCUS CIRCUS contest (thank you Walt Schroder). Dave Grey said that he was extremely impressed with the operation of this latest Expert Series in their Du-Bro choppers. They, too, have flown these under maximum interference conditions with exceptional results. Paul mentioned to me again Dave Grey's comment was that they were particularly impressed with the smoothness of our system. Incidentally, Dave Gray is using our S-10 servo.

2 Here at World Engines we use a pattern airplane — Kaos — as a test bed. Dave Brown and Mark Radcliff are functioning as test pilots, basically because they are excellent pattern flyers and they can tell if they are getting a small glitch or funny. Definition: A glitch is a big funny and it is something that is happening in the airplane that should not be happening. Frankly, after making this change, we ran a test flight of thirty modified receivers. This, in itself, is no small chore as the plane has to be landed and the receiver changed before each flight is made. All of these receivers worked much better than anything we have ever built before. Also, as a check for vibration, our Sales Manager, Paul Benkner, is flying one of these of this configuration receiver in a Pilot Shell Fly "B". This Shell Fly "B" is a good model for a 30 or a 40. It has an all plastic fuselage. When you are running this airplane full blower with a 60 in it, there is much fuselage back there to dampen any vibration and also it is moving through the air considerably faster than with the . Here again, our conclusions are reinforced by the fact that the whole flying program with this airplane could not have been better.

3 ADJACENT CHANNEL. We have not had a chance to check out the new design in ten or fifteen pylon races but adjacent channel is something that you can simulate pretty well in a test area with a number of transmitters turned on and closer to the model than the operational transmitter. Our opinion is that this new configuration gives an adjacent channel rejection that is, for all practical purposes, totalled. Paul Benkner is looking over my shoulder while I am writing this advertisement. He corrects me on this point. He says that he and Pat Malone and Cliff Kell had three models taxiing up and down the runway immediately in front of them. They actually crossed antennas so that the metal of the three antennas were touching together and kept the taxi program going and operation continued perfect. So far as flying this system with different brands, we have operated under test conditions with our radio, the one that is flying the airplane, plus a Sanwa, plus two Krafts, plus ProLine, all on the other 72mc frequencies and this checked out fine.

Our 5-channel Expert Series with 5 servos $329.00
Our 7-channel Expert Series with 7 servos $369.00
Our 7-channel Expert Series with 5 servos $399.00
Our New Las Vegas System 4-channels, 2 ..... $170.00

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the turbulence cartwheeled his ship onto the backside of the slope.

As in the past, the party atop "old baldy" was terminated with a repast of vintage wines and rare cheeses.

We look forward to the third annual Oktoberfest Slope Bash and hope to see you all with us.

(AAM has a new West Coast Soaring correspondent. Larry Fogel is a real enthusiast who recently was elected President of the Torrey Pines Gulls. Larry's deep involvement and energetic approach to soaring is readily seen in his writing. Those wishing to contact Larry should write him at 1591 Calle de Cinco, LaJolla, Calif. 92037.)

What's Really Fair (by Larry Fogel): In recent months I've noted a cleavage in our club. Checking further, I find this split personality developing in other groups. There are those who believe that the primary purpose of a club is, or should be, to foster competition. How else can you bring out the best in flying skill? Then there's the satisfaction of winning.

There are others who insist that competition distracts from appreciating the wonder of RC soaring. You design, build, and fly to get away from the rat race of daily life. Competition defeats sheer relaxation and discourages the novice and newcomer. Perhaps we can overcome this difficulty and unify those of different viewpoints by adopting a new philosophy of competition.

Why not ensure that local-level contests include a significant amount of chance, in addition to requiring skill. The beginners are drawn to compete by the gamble involved, the skillful bececause they can overcome the vagaries of chance through consistency.

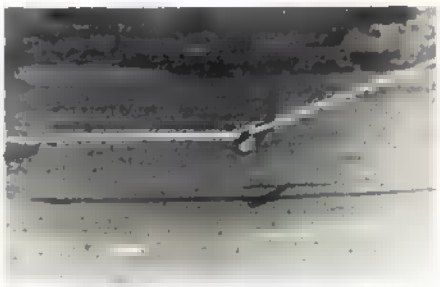
Torrey Pines November Contest. . launching over 400 ft. above the Pacific.

The Torrey Pines Gulls R/C Soaring Society has attempted this philosophy with some success. One of our monthly contests hinged upon one's ability to predict his own performance score in Precision Landing. Our November contest was 2 Min. Duration and Precision Landing, with lift obtained from the slope. But the trick was to estimate the 2 min. without assistance while flying your aircraft. Contest Director Ray Smith required each timer to challenge his pilot with three mental arithmetic problems during each of his three trials. You can't count seconds while adding two-digit numbers.

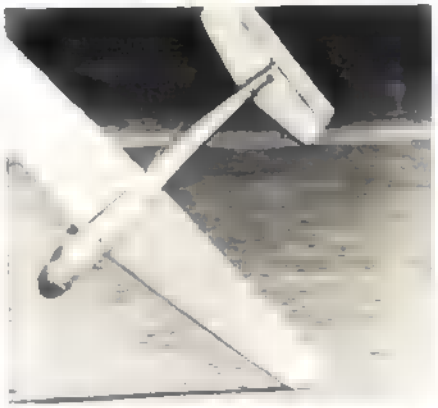
The results: Of the 360 points, W. Tiahart achieved 343. Others with a "built-in clock"

Alex Mladineo flying the Ken Banks-designed Ocotillo.

Heavy traffic in the landing area.



A Windfree zeroes in on the spot.



A Canyon Plastics Schweizer demonstrates an unusual landing technique (not that unusual, ▬ that I think about it).

were Alex Mladineo (335) and Ray Smith (334). Max landing points was 180. Of these, Jim Pike won 169, Bill Hook 168, and Bruce Lohse 166. Overall was carried off by our visitor from the Midwest, W. Tiahart (496). Bruce Lohse captured second place with ▬ points. Jim Pike placed third with 486.

More serious contests should *be* more serious. . .with every effort made to remove chance and measure real skill. But, let's keep a significant amount of chance in contests ■ the local level. This way we encourage enthusiasm in those ▬ to our sport, and the champion is readily forgiven for having had a bad day on the basis of "bad luck." Without shame, I can admit to placing eighth in a contest of 12 entries.

Timely Technical Tips (by Larry Fogel): Does your sailplane tend to stall on final approach? If so, it may be due to excessive rudder and elevator throw. Your desire for as much maneuverability as possible can lead to unwanted drag when it is least desirable. For example, your Windfree flies best with only the usual-length servo arms.

If your Cumulus tends to fishtail at high speeds, you can correct this by bending the rudder pin just enough to remove the excessive play. It's amazing how well this works.

Here is another way to hold your canopy in place. Rub a tiny bit of clay ▬ the front and back surfaces—just enough to ensure a snug fit.

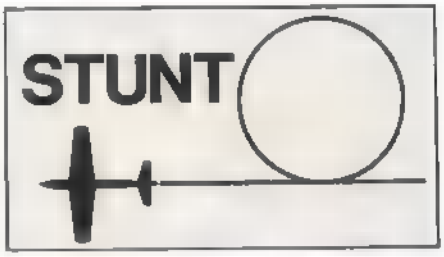
Have you faced the problem of launching by hi-start into a crosswind, which promises to blow your parachute into the brush or trees bordering the runway? Simply tie a knot in the parachute so it cannot open after release of the sailplane. Upon release, it then falls straight down. It's easier to walk the extra distance than to attempt to disentangle nylon cord and parachute from branches, twigs and leaves.

If your fuselage is slippery, and thus hard to hold under the tension of your hi-start, why not glue finger grips of sandpaper or emery cloth on either side? Alternatively, glue a small piece of window ▬▬ to each side, then paint over this material to yield a corrugated grip which is easy on the eyes.

Do you have sticky Nyrods? Try pushing ■ tiny wad of cotton through the outer tube, using the inner tube as a pusher. Dipping the cotton ■ alcohol first helps clean out the tube.

At times you may face the need for getting inside an already-closed and covered fuselage. To make ■ temporary hole that will become invisible, cut the required size rectangle with your knifeblade held at an angle, ▬ ▬ to yield a beveled edge. Hold the removed piece aside until you have completed your internal repairs, then glue it back into place. The large surface ▬ ensures proper fit and strength of the bond. Sand for smoothness and recover, using the removed piece or a slightly larger one.

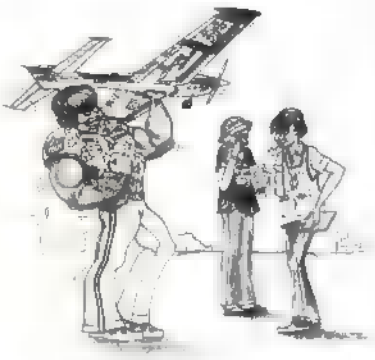
These ideas were gathered from conversations at Torrey Pines with diverse individuals. At times listening ▬ be ▬ beneficial ■ flying.



LEW McFARLAND ON C/L STUNT

Competition: Bill Pardue, CD for the recent, very successful Southeastern Control Line Model Championships, reports, "CL is *alive and well,*" but asks, "What turns you Stunt guys on in the way of ■ contest?" Bill reported seven entries in AMA Stunt and eight in Novice. I ditto this after CD'ing the Mid-America, where we offered six categories of Stunt Competition, but drew a total entry of

(Continued on page 78)



NO WAY! YOU tell 'Mr.Terrific' thar he missed the finals by ONE POINT!

only 17. I think the problem is partially local in each community, in that we are too busy doing our own thing to help nurture the younger set into full-fledged competitors and get them to contests.

Results show Les McDonald and Tom Dixon coming on strong in the Southeast, with Dick Pacini and Dennis Duvall doing well in the Central States. Bill Simon and Gene Schaffer fight it out in what appears to be strong stunt country in the Northeast, with many as 20 entries per contest. Watch out for a "dark horse" named Jim Lynch.

PAMPA Guidelines: Guidelines to better administer local contests have emerged from the PAMPA Competition Committee. While not specifically covered in the AMA Rule Book, these ideas can be used to make for a efficient and fair contest.

Publish the exact day and starting time when Precision Aerobatics will be held. Fifminutes before starting time, hold a pilot's meeting to over rules, local conditions, times, and to draw for flying positions. Two methods for drawing: draw for both flights at the pilots' meeting; draw for second round immediately after first flight, with flier's score not being posted until he draws.

The Competition Committee recommends there be a minimum of three judges. Judges should have recorders. One runner should be on hand take scores the tabulation table. Tabulation should be with an adding machine that has a tape. The tape should be stapled to each score sheet.

A idea in appearance judging came up at the King Orange PAMPA Symposium: Judge all planes the time in the Stunt pits before the first round starts. This allows for better comparison between planes and will time. An alternate method of Stunt appearance judging was suggested at the KOS: Allow one judge to award points for appearance and count this for all other judges. Post appearance points on the result-board.

Precision Aerobatics should have one circle reserved for the whole day of competition. If other events to be flown on the same circle, this should be published in the contest announcement.

A pilot should notify the judges if he intends to perform a warmup maneuver before the hand signal, to avoid confusion. Judges should be continually on the move to stay directly upwind of the flier.

The event should start the listed time with appearance judging. If a flier makes an attempt, he should be moved down one slot only. If the second round of flying is not completed (weather, other event conflict) all second-round scores should be discarded. There should be a maximum of 60 min. between the two rounds.

Pilots should check their score sheets and initial them, signifying that the tabulation is correct. A flier reporting to the Event Director after the pilots' meeting shall fly immediately after the man in the air at that time. A late flier, reporting with three or fewer fliers remaining in the first round, shall forfeit his first round flight.

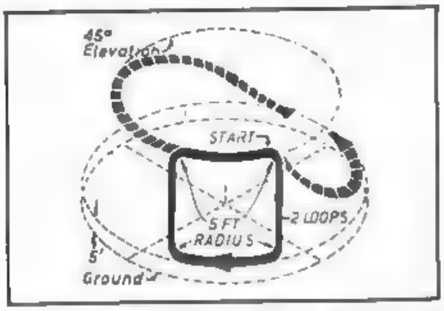
As listed in the AMA Rule Book, every stunt flier should make two complete flights. Contests which are so overloaded that two flights cannot be completed should be reported to AMA.

Results of both rounds should be posted in a conspicuous place. Final results should be sent to *Stunt News* for publication. (It wouldn't hurt to drop Lew a line, too—*php*.)

Maneuver of the Month: From AMA Rule Book:

13.8. CONSECUTIVE OUTSIDE SQUARE LOOPS (Two Req'd.). Consecutive outside square loops are judged correct when the model starts from level flight at 45° elevation and flies a square course (starting with a vertical dive) consisting of two loops, each with four outside turns of approx. 5-foot radius and straight, equal length segments, with bottom segments at normal level flight altitude and top segments at 45° elevation. Maneuver begins and ends with model in level flight at point of start of first turn. Model recovers into normal level flight within a quarter lap.

Maximum 40 points. Minimum 10 points.



Errors: Model wobbles or mushes [redacted] turns. Lower altitude is not 4-6 feet. Upper altitude is not within 2 feet of the 45° elevation point. Turns ar[redacted] not precise and exceed 7-foot radius. Sides of loops are not equal. Second loop is not in the same flight path of first loop.

Comments relating to Inside Squares (January, 1975, AAM) apply, but we have a few complications—one real, the other psychological. The real item we must contend with is gyroscopic precession, which tends to cause the plane to turn in as the abrupt control (force) is applied to make the outside turn. If you want to see real proof, just put a low-pitch prop on your engine, and wind it up very high on a light plane. The "Rabe rudder," and "Palmer differential flaps" were both innovations to counter gyroscopic precession. They both work, but, due to the potential opposite action of adverse yaw, if not properly set up the end result varies considerably with the builder and the plane.

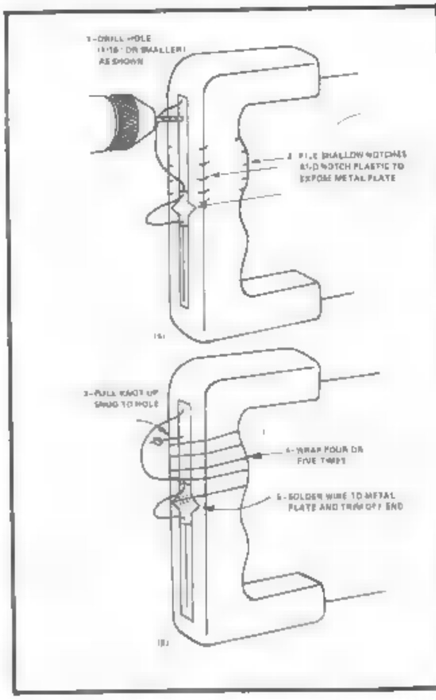
The psychological complication arises out of the initial portion of the maneuver, since it requires a dive toward *terra firma*. This tends to challenge even the staunchest [redacted] the pull-out into inverted flight [redacted] only 5 ft. of altitude is approached. The best way to overcome this problem is to [redacted] totally familiar with the regular, Round Outside Loops, as well as the Reverse Wing Over—work toward an automatic reaction.

A common error, climbing to gain altitude (above 45°) just prior to the first leg, can [redacted] detected among even the more proficient fliers. A little concentration can eliminate this. Entry and exit have an effect on the score awarded in all maneuvers, but [redacted] most obvious in the Outside Squares. Don't expect the bottom elevation to be correct at first. Start high and work it down—as in other maneuvers, be patient.

Handle adjustment has not been mentioned previously, and this can cause the turns to be loose in one direction and tight in the opposite. You should not hesitate to make slow and minor handle adjustments to prove or disprove the possibility of such a condition. It is imperative that the plane turn the same in both directions when Eights are flown (Bob Hunt—What happened to that handle that could be adjusted in flight?)

Shocking: Most of us have been bothered by static electricity while flying at one time or another, but it is [redacted] real problem for the San Joaquin Valley (Calif.) fliers. LCDR Graham H. Hicks offers the following solution:

The standard EZ-Just handle is prepared by drilling a small hole through the trunk near one end of the adjusting slot. Then, four or five sets of shallow notches are filed (or cut with a Dremel tool, [redacted] I did) around the trunk to seat the wire winding. A final slot is cut diagonally across the center of the metal adjusting plate to allow the wire to lie flat for soldering. It is also helpful to trim off the four corners of plastic that will surround the solder joint.



Finally, using about 18" of any small, *bare (not enameled)*, hookup wire, tie an overhand knot in one end of the wire and poke the other end through the hole from the rear. Pull it snug, then wind it tightly into the notches

(Continued on page 80)

around the handle. Lay the wire into the slot across the metal adjusting plate and solder it, using no more heat than necessary for a good connection. I provided a little extra [illegible] by dabbing a tiny drop of one of the [illegible] cyanoacrilate "super glues" onto the wire at each notch to help hold it in place.

With the hand touching this winding at all times during flying, static electricity is dissipated instantly into the body before it has a chance to build up to "zapping" levels. It should be emphasized, however, that flying [illegible] power lines with this modification is even more dangerous than before, since the virtually nonexistent, "chancey" protection of the plastic insulation from the handle is now completely bypassed.

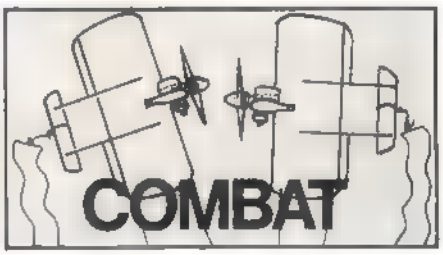
Foam Wings: In recent years, the foam wing has become popular in RC and now appears

Installing a bellcrank in a foam [illegible] is easy. Epoxy a ply plate above and below the bellcrank, of [illegible] *(Photo by Andy Lee)*

to be well-respected in the stunt circle. Once you are set up, it is rather simple to cut your own foam core and sheet with 1/16" lightweight balsa. Foam may be obtained from Sig or a shop that carries their products.

The foam cutter consists of a nichrome wire attached to an inverted "U" of wood or insulated frame. DC current from a transformer or wet cell is applied to produce heat for cutting through the foam, as the wire passes along plywood or metal patterns at each end to achieve the desired airfoil. Either a coring process or the cut-out method with false ribs should be used to reduce the weight further.

I find it easier to buy wings from either Bob Hunt of Control Specialties Co., 110 Egel Ave., Middlesex N.J. 08846; or Arnold Stott of Foam Flite, 628 W. 6th St., Mankato, Minn. 56001. I have had excellent results with both of their wings, with a total weight of no more than 14 oz. on a 650 sq. in. (with all controls, tips and flaps). I would point out the need to select light wood for the tips and flaps.



DAN RUTHERFORD ON COMBAT

P. T. Granderson's strange Combat rules: In last month's column, I mentioned that Phil Granderson made up an unusual set of Combat rules and then sponsored a contest to try them out. Check the February, 1975, AAM for Phil's rather sketchy rules.

Phil's meet [illegible] a lot of fun, but did the rules work? Ah. . .no, not quite. The main problem was that most of the matches ended in ties. Without the usual air time points to use as a tie-breaker, undecided matches were all too common.

Before the contest, [illegible] didn't anticipate this, so scoring for the overall results got a little bogged down. So bogged down, in fact, that first and second were decided by a flip of the coin! In this particular instance, flipping a coin was agreeable to all involved. But it is no way to choose the winner of a Combat meet.

The fact that Phil's rules didn't work right, first time out, doesn't really matter. The important thing is that he was willing to *try* something new. Now that he knows what doesn't work, [illegible] waiting for his next set of rules!

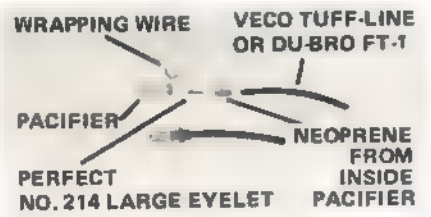
If you don't like the present AMA Combat Rules, try something new. Don't just complain. The AMA Rule Book allows you to use different rules in sanctioned competition. See page 3 of your current Rule Book. You *do* have one, don't you? If you do stretch the rules, be sure to let out-of-town contestants know, in advance, what to expect. Changing rules on the day of a contest, by contestant vote or not, is not the way to go.

Dirty Dan's Handy Hints: I want to make this a regular feature of this column. Hopefully, some of the items presented will make life easier for you and harder for your opponents. A broken set of VooDoo booms is offered to the person who suggests a better name than the one above for this section of the column. And $5.00 is offered to the person who sends in the best suggestion concerning what to do with a set of broken VooDoo booms! (No prize will be awarded for telling Dirty Dan

where to put them—*php.*)

The first Handy Hint (sounds like something from *Mechanix Illustrated)* has ■ do with baby pacifiers. Specifically, how to tie them for use ■ a combat tank.

Here is what you will need: A Binky baby pacifier (the kind with the ribs inside works best), fuel tubing (A&L "Tuff-Line" or DuBro FT-1 are good), ■ package of eyelets ■ sold by Perfect (item 214), and some good wrapping wire.



Use a C-clamp to secure the wire and snug-up two turns of it around the pacifier neck. Don't pull so tight that the rubber is cut. *(Photo by Tom Maycock)*

Rip the plastic junk out of the pacifier. Suck on the pacifier, if you want, as you won't need it for a minute. Select a large eyelet and push it into the end of your fuel tubing. You can use a short section of 1/8" brass tubing instead of the eyelet, if you prefer. The piece of neoprene in the pacifier is removed—assuming you haven't become attached to the pacifier—and the end is cut off. This is then slipped over the end of the fuel tubing that already has an eyelet in it. Now put the pacifier on over the whole ■■■.

To tie the pacifier onto the tubing, try my favorite method. Anchor one end of the wrapping wire solidly to your bench. Take two turns of wire around the pacifier, being sure that the wire doesn't overlap itself. Now for the good part: While pulling on the free end of the wire, simply roll the pacifier along the wire.

Depending on how tight you hold the wire, it is possible to cut right through the pacifier, so be careful. When you are satisfied that the wrapping is tight enough, twist the pacifier several times to tie off the wire. Cut the free ends of the wire, tuck them under the ridge at the front of the pacifier, and you are done! The accompanying photo should clear up any confusion.

The above method of wrapping also works well on pen bladders—but be careful, as they are fairly easy to cut through if you get the wire too tight.

The fuel ■■ use is poisonous. Please refrain from sucking on ■ pacifier that has been used!

More Hints—From *The MACA Newsletter:* An A&L Veco bellcrank is good, but can be improved. Throw away the bolt supplied with the crank and try using ■ 1" long, 8-32 round head screw instead. The bushing is too small for the screw, ■■ drill it out with a No. 22 drill. You will have less slop ■ the control system, giving you slightly quicker response.

The stock main bearing used in G-21 Super-Tigres likes to self-destruct. Replace it with ■ New Departure 3L01, ■■ ■■ equivalent Fafnir bearing with steel cages. These bearings may be obtained ■■ your local industrial bearing supplier. Replace the bearings before running the engine, not after you have ruined a head and piston/cylinder set. To be fair, I must mention that the stock bearing gives little trouble until you use the engine on an AMA (Fast) Combat plane.

Join MACA: Send $4.00 to Tom Southern, 2207 Paul, Longview, Tex. 75601. You'll be glad you did when you start getting the monthly *MACA Newsletter* and see what Tom Southern and Bill Allen are doing for Combat.

Want a cheap thrill? Fly Combat!

Manufacturer's Rebuttal: This is ■ comment by John Maloney, President of World Engines, and the SuperTigre agent in the United States.

"In the January issue of American Aircraft Modeler, this column's editor, Mr. Rutherford, writes that SuperTigre parts are virtually impossible to obtain in the United States. My purpose in making this rebuttal is to show that, in our opinion, these statements ■■ essentially untrue. In the last 24 months, we have imported and stocked 46,050 Super-Tigre engine parts (needle valves, screw sets, gasket sets—each counted as one part). The retail value of these parts was something over a quarter of a million dollars. Some 10,995 of

(Continued on page 82)

these parts were for Combat 35 engines.

"At the time that Mr. Rutherford's statements made this magazine in January, we had 90 crankshafts and 125 crankcases for the SuperTigre 35 engines that he was complaining about—in stock. Our proof for these numbers is our auditor, Arthur Andersen and Co., and United States Customs records. We recently have shipped some SuperTigre parts to the following California accounts." Here is the list:

Bridi Hobby Enterprises, Wilmington.
California Model Supply, Fullerton.
Colonel Bob's, Costa Mesa.
Eastman, Fresno.
Ernie's Toyland, Marysville.
Yvette's, Santa Monica.
Franciscan, San Francisco.
Fresno Hobby, Fresno.
Gary's, Gardena.
Gunning's, San Anselmo.
Hobbies Unlimited, San Lorenzo.
Hobby Center, San Diego.
Hobbycraft, Stockton.
Hobby House, Sacramento.
Hobby Mart, Riverside.
Hobby Shack, Buena Park.
Howard's, Concord.
Huston's, San Jose.
J & M, San Carlos.
Jensen, Glendora.
Ken and Edie's, Newbury Park.
Leary's, Freemont.
Lee's, Poway.
Lindco, Santa Cruz.
Mike's El Cajon.
Modesto Hobbies, Modesto.
Natick, Los Angeles.
Root's, Oakland.
San Antonio, Mountain View.
Standard Hobbies, Rancho Cordova.
Stan's, Chula Vista.
T & A, Burbank.
Target Hobbies, Rialto.
The Toy Depot, Chico.
U.C. Hobbies, Oceanside.
Uncle Don's, Palm Springs.
Wayne Gunsmith, Novato.
West Coast Hobby, San Diego.
Wiley's, San Diego.

ELECTRIC FLIGHT

MITCH POLING ON ELECTRIC FLIGHT

Solid State Throttle: Hardy Benson, of Benson Hobby Products, sent the following letter on his proportional throttle.

I am enclosing a specification sheet for the Model SC-1, solid-state, speed control servo for electric RC aircraft or boats. This device has been developed over the last six months primarily for control of the Astro-10 and Astro-25 power systems, which I have been flying. However, the device can be used to control almost any electric power system except for those which are too low in power to carry the weight of a digital control system.

It can be argued that a simple on-off control is all that is needed at the present state of the art in electrics. However, an on-off control usually requires the use of a separate servo, plus a mechanical linkage to a switch. The SC-1 replaces all of this for less cost than the average standard servo, weighs about 1 oz., has no moving parts, and provides proportional speed control with practically no top-end rpm loss.

(Continued on page 84)

Benson's throttle is simple to install.

The SC-1 throttle control (indicated by arrow) installs compactly in an Electra Fli.

HAVE YOU LOOKED THESE OVER YET?

FS-32
SPAN 68 in.
LENGTH 52½ in.
AREA 600 sq. in
FOR ENGINES .50 to .61

$51.95

GAZARIATOR

(Super Fledgling)

For The Sport Flier...
...And Especially the Newcomer to .60 Radio Control Flying

If you are a Sport Flier or a newcomer to R/C then this is your ship. It's a good looking plane that builds easy — goes together fast — plenty roomy for any equipment — rugged for hard use — flies comfortably — and is just the right size, for a .60.

AND ABOUT THE KIT ITSELF... Fuselage sides are one piece with ply doublers back past the wing. Only a few and a shaped top make for almost instant fuselage. Torsion main gear & sprung nose gear (or fly it as a tail dragger). Aluminum engine mounts, etc.

The complete wing is built on the work bench without having to remove it which eliminates warps — All parts are die cut, carved, etc. Balsa sheet cover keeps warps out and makes for a tough wing. Tapered Strip Ailerons are simple to install. Wing is installed just like the low wing jobs, using dowel pins and nylon-screw in maple nut-block, like it ought to be. No rubber bands to deteriorate or slip or tear up.

Elevator and Rudder are sheet Stab & Fin is built up and sheet covered to keep it flat, so that's it, a fine kit of a fine ship.

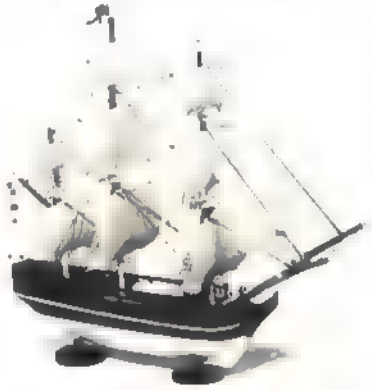
Included is all the linkage hardware pushrods, and elevator horns, bellcranks, connectors,

SAILFISH

Finest Sailboats you ever saw either Free Sailing, or Radio. Construction is simplicity itself. Die Cut Frame, features Plywood for strength and rigidity. Printed-planked Deck is Die Cut and ready to slip into rub-rail, molded into Sleek Plastic Hull. Kit is unusually complete with Die Cut Mahogany Cabin, Brass Chain, Metal Fittings, CLOTH Sails, Rigging cordage, Mast & Boom stamped, Rudder and INTEGRAL LEAD BALLAST, Step by Step Plans show simple assembly. Base shown not included.

HEIGHT 12"
LENGTH 24"
BEAM 5"

KIT-S-21
$14.95



G1 Spanish Galleon
G2 USS Constitution
G3 Schooner Blue Nose
G4 HMS Bounty
G5 Golden Hind
G6 Pirate Brig

All Just $6.95 ea.

Authentic Replica Series

Every kit contains a machine carved hull, genuine metal castings of Cannon, Life Boats, Anchors, Steering Wheel, Stern Castles, Figurehead, and many other castings as needed. Also Chain, Block and Tan Rigging Line, Printed Cloth Sails, Decals, Display Pedestals and all the rest that go to make an easy-to-build full rigged sailing ship that will gain in intrinsic value as years go by. Models truly worthy of a place in your home or any museum.

BeGINNeRs FUN SeRies

13 of 'em—2 at $4.95 the rest $4.50

If you really want to have some fun, then go out and get one or of these nifty control line models. They're the easiest s in the world to assemble—all wood, no tissue covering—only 8 to 9 parts, depending the model (except the Fokker which has a few more, because of the struts). Genuine Nylon motor mount ready to bolt in place—Complete control system (less handle and lines) decals, landing gear, wheels etc.; which makes building a cinch and assembly literally in minutes.

STERLING MODELS 'G' ST. PHILA., PA. 19134. If dealer available, direct accepted—with 10% additional charge for handling and shipping. (80¢ minimum in U.S., $1.25 minimum outside U.S.)

- ☐ Catalog of entire line of airplane control line model kits, R/C scale and Trainer kits, boat model kits, accessories, etc. 50¢ enclosed.
- ☐ "Secrets of Model Building." Including design, construction, finishing, flying, adjusting, systems. enclosed.
- ☐ "Secrets of Control Line and Carrier Flying." Including preflight, soloing, stunting, Carrier rules and regulations, Carrier flying hints and control line installation instructions. 25¢ enclosed. No checks. Only U.S. money orders or currency accepted.

Name .....

Address City State Zip

Sterling MODELS INC. U.S.A.

ELECTRIC FLIGHT

(Continued from page 82)

The Benson Hobby Products SC-1 operates directly from a standard digital receiver throttle servo output. It provides full-stop-to-full-speed proportional motor speed control.

Specifications

Case Size: 1 x 1 x 1.5"

Approximate Weight: 1 oz. (plus connecting leads).

Control Capability—Voltage: Up to 20 V (motor battery open ckt.). Current Up to 15 amps (motor current at high throttle).

Receiver battery drain: Less than 10 ma.

Motor battery drain: Approx. 10-250 ma (depends on motor battery voltage and throttle setting).

Required pulse polarity: Positive (negative pulse model available on special order).

Standard phasing: Wide pulse equals high throttle.

Pulse width requirements: Adjustable by two trimpots.

Voltage drop: Not more than 0.3 V (full throttle, 15 amps, external wiring drops not included).

Ordering Information

Price: $29.92 ppd. (Arizona residents add $.90 sales tax).

Terms: Send check or money order. No COD please.

Address: Benson Hobby Products, 6240 Placita Pomona, Tucson, Ariz. 85704

This columnist has been using the throttle on his Astro 05 powered School Girl (Top Flite kit) and it is excellent. Top rpm on a Cox 6 x 3 prop is 15,500; and climb-out and flight duration are just as good as before the installation of the throttle. It allows a full range of rpm, from zero to full speed, and impresses the spectators, not to mention the pilots! All up weight of the School Girl, flown as a monoplane, is 34 oz. (rudder, elevator, motor), with a Cannon Tini Block, two servos and the solid-state throttle.

Until I installed the SC-1, I had overshoot problems on landings. Now all my landings are spot landings. I recommend this unit to anyone desiring a lightweight throttle control; it replaces one servo, and weighs less than any servo on the market.

Electric Power Unit Design: Designers of models always have their own pet ideas on what works best, so in line with recent comments on Mabuchi motors, I'll run along some ideas of my own on power units. I am not ambitious enough to attempt gearing, so all my units are direct drive. This means that they must turn a prop at rpms comparable to that of the glow engine ordinarily used in the plane I am building at the time.

Right, you guessed it, I also am not ambitious enough to design planes for electric power, so I use kits. The units usually must turn in the 10,000 to 17,000 rpm range, depending on the propeller used. For 010 units, I use the Cox Gray 4½ x 2 or the Top Flite 5¼ x 3 nylon. Minimum for the Cox prop is 14,000; and for the Top Flite, 10,500. These values are the initial rpm from a fresh charge.

Given the prop and the rpm, the batteries' current capability is a determining factor. The GE Permacells can deliver six to eight amperes without overheating; the Astro batteries can deliver up to 10 amperes (available from Astro Flight). These currents will provide three to six min. of flight time, for .500 to .550 ah batteries.

The last step is the motor. It must be wound so that it will produce the rpms desired, without exceeding the currents listed above for the batteries used. For .020 power, usually four to six cells are required (assuming that pencells or Astro batteries are used). About 35 turns of No. 26 wire per pole for three-pole motors, or 30 turns per two poles for five-pole motors is about right.

(Continued on page 109)

BOOKSHELF

(Continued from page 14)

mysteries and vagaries of achieving beautiful climbing turns with a roll-out at the top that lets the glider keep all the altitude your mighty heave gave it. As a nice optimistic touch, Kaufman provides details for dethermalizing the product in his section on contest flying.

And, as in many modeling books, some of the advice intended for one area of the hobby is of equal value in others. For example, trimming is—or should be—common to all airplanes, so that section's instructions apply everywhere.

The author tells how to pick the best part of a flying site and the ideal conditions for letting her go to get optimum performance. This is advice which will serve all FF types and thermal-chasing RCers well. Since it's the only book I know of on the subject, saying that it's the best offers only faint praise. But it is a remarkably complete and well-done book at the remarkable price of $4.95.

AERO SPORT

(Continued from page 20)

Wings: Begin by cutting forty-four R4, two R3A, two R3, two R2 and five R1 ribs. Pin and glue the trailing edge stock and the lower rear spar on the lower TE sheeting. The ribs are then glued into position, followed by the upper rear spar and sheeting, the two forward spars, and the 1/8" subleading edge (this 1/8" provides a base for the 1/16" LE sheeting).

When completely dry, remove the wing panel from the building board and add the LE sheeting. The LE of ½ x 3/4" soft balsa is then glued into position and carved to shape. At this point, the ailerons can be cut from the wing panel. Use an X-acto razor saw with the stiffener removed; the blade will remain stiff enough to make a fine cut through the trailing edge. After installing the aileron control horns, the wing and ailerons are faced with 1/8" balsa. The

(Continued on page 88)

Plans Service

BEAUTEOUS BIPES

1141/EAA ACRO-SPORT—Scale and Sport Pattern Bipe. Model of the most exciting homebuilt of the decade is a natural for the NSPA event. Simple construction ▬ use either built-up or foam wings. Four ailerons for championship aerobatics. Four-function radio. Sixty engine. Designer: Robert Schulthels. (November, 1974, **AAM**) **$3.75**

Special Offer: 1141-A—Bill Blake's cutaway drawings of both the full-scale and model Acro-Sport. Large size, suitable for workshop wall display, only **$2.00**. When ordered with the model plans specify Plan Service number 1141B for all three and remit **$5.75**

1042/MALLARD—RC Sport Bipe. Designed to do the Pattern, this unorthodox-looking bipe can serve ■ a good introduction to the NSPA event. Trike gear and lack of cabane struts make building a snap. Retracts not shown, but very possible. All-balsa construction. Sixty engine. Four-function radio. Designer: Dan Deluca. (October, 1974, **AAM**) **$4.00**

SEAPLANES

0841/OSKER—RC flying boat. Either built-up or foam 56" span wing. Radio is sealed in unusual waterproof compartment that is integral part of wing/cabin assembly. Fuselage is basic box structure, with ▬ tricky keel construction; 35-45 power. Four-function radio; 60 powered version available—see below. ■esigner: T. R. Thorburn. (June, 1974, **AAM**) **$5.00**

0842/OSKER + 10%—Same features as regular Osker, but for 60 engines. Designer: T. R. Thorburn. (June, 1974, **AAM**) **$5.50**

0283/FLYMOBILE—*RC trainer and convertible seaplane. All-balsa construction. Pylon mounted engine for trouble-free water operation. On land, the model uses dual landing gear (four wheels) like a "roadable" plane. On water, the LG adapts easily to pontoons. Three-function radios; 29-35 power. (February, 1975,* **AAM**) **$5.50**

1144/SEASQUARE GT/RC FLYING BOAT—Essentially a conversion of the popular ▬ Quickfloat, this design offers excellent water handling and flying characteristics. Pod-mounted engine (29-45 power) ▬ elevated tail surfaces give it a distinctive look. All-balsa construction. May be flown with either three or four functions; 54" span. Designer: George Wilson, Jr. (November, 1974, **AAM**) **$4.25**

0833/SPECTRA—Semi-scale RC version of an amphibian with engine mounted on a pod in tail. Plane has T-tail stabilizer, wing tip floats, 48" span for 23 to 40 engines, and four-channel radio. Designer: Jim Sunday. (August, 1973, **AAM**) **$4.00**

RC SPORT

1143/WHIPLASH—RC Sport. An intermediate sportabout for aerobatics, yet with an emphasis on fast building and durability. Fifty-inch span, foam wing with ■ box construction, balsa fuse. Four-function radio, ■ engine. Designer: Dick Sarpolus. (November, 1974, **AAM**) **$3.00**

1142/LEW'S AKROMASTER—CL and RC Stunt and Sport. Designed by top CL competition flier Lew McFarland, this design ▬ be flown either CL or RC. Built with either ■ foam ▬ balsa wing, it can be made as a one-piece plane or with removable wing. Lots of personal creativity. Forty engine, and four-function radio for RC version. (November, 1974, **AAM**) **$4.00**

OUR BEST TRAINER

0942/AEROSPORT—*RC Trainer and Fun Flyer. Ruggedly constructed, large (62" span) and easy to fly, this model makes ▬ excellent first or second ship. Semi-symmetrical wing keeps zooming and stalling tendencies to ■ minimum, while enabling basic aerobatics. 45-60 engine and four-function radio. Designer: William Patterson. (September, 1974,* **AAM**) **$5.25**

0324/2T—Ace foam-winged, RC trainer for 049 power carries 2-channel bricks with case. With the discontinuance of Ace's fine kit, **AAM**'s pla▬ are the only way to build ▬e. Designer: Ron Jacobsen. (March, 1972, **AAM**) **$2.00**

0691/JR. SKY SQUIRE—RC sport-trainer by Jess Krieser uses .09 to .19 engines. One of the most desirable trainers ever designed. The original version of the ever-popular Midwest kit. Area, 416 sq. in.; span—48"; weight, 3 lb. (June, 1969, **AAM**) **$2.00**

0692/1/2A SKY SQUIRE—Small-scale version of famous Sky Squire. Probably more of these have been built for R/O pulse flying (and with two-channel systems) than any other design. Its realistic looks are what give it appeal, although it's exceptional stability is ■ definite plus factor. Designer: Jess Krieser. (June, 1969, **AAM**) **$1.75**

BEGINNERS CL PACKAGE

0231/MUSTUNT I—Primary profile fuselage, upright .35 engine, thick airfoil stunt trainer. By Al Rabe. (February, 1973, **AAM**) **$2.25**

0232/MUSTUNT II—Advanced stunt trainer, ▬ aerodynamics as Mustunt I, but fully shaped fuselage and upright .35 engine. Capable of winning any meet. Designer: Al Rabe. (February, 1973, **AAM**) **$2.75**

0233/MUSTUNT III—NATS-level, 35-powered non-scale competition CL stunter is exactly like Mustunt II, but has many detail refinements and tapered wing. Designer: Al Rabe. (February, 1973, **AAM**) **$1.00**. You'll need 0232 for complete construction details, order separately.

PATTERN

0154/SEQUEL—*RC Pattern. Now the newcomer to pattern can build ■ competitive model. The two-part article (January and February, 1975,* **AAM**) *is replete with photos of the construction sequences. This is a step-by-step presentation, with lots of handy hints to ensure success. It ■ suggested that you have the magazine articles on hand (back issues available at $1.25 ea.) Four-function radio, 60 engine. Designer: Bud Weber.* **$8.75**

0154A/SEQUEL—(Special Offer). Since the author recommends duplicate plan sets for proper building of this model, **AAM** ■ offering *two* Sequel pans at ■ special price. Specify Plan Service No. 0154A and remit **$15.75**

THIS MONTH'S PLANS

0353/STEPHENS AKRO—CL Semi-Scale Stunter. Designed by Tom Dixon with ▬ emphasis on Semi-Scale realism and top maneuverability. A proven trophy winner. Plans show both commercial foam core and built-up wing. Uses 40-46 power. **$4.25**

0351/SENIOR AERO SPORT—Scale and NSPA aerobatic bipe. While ▬ exact scale rendition of an EAA Grand Champion, home-built winning bipe, this model has full aerobatic capabilities. Designed by Mark Frankel, the plane has 67½" of wing and flies on 60-80 power. Two large, detailed plan sheets. Four-function radio. **$9.00**

0352/PFALZ ALARM—RC Sport sailplane. Scalloped trailing edges and iron corsses, a la Ugly Stik, ▬ the motif of this WWI-looking glider. Simple construction and easy, Sunday flyer performance ▬ to the enjoyment of this two-function project. Large, easy-to-follow plan. Designed by Jack Headley. **$4.50**

0842/PACER—049-powered Pattern ship. Capable of good pattern performance, this design, by Owen Kampen, uses Ace foam wings. The ▬cer has enough maneuverability to qualify as ■ small field ship for even the most discriminating flier. This sleek low-winger has all the good looks of a pattern design, too. Two-function radios. Tee Dee 049-051 engines. (August, 1974, **AAM**) **$2.50**

0711/PHOENIX 5—Don Lowe's famed pattern design is based on pattern philosophy of a plane that will win in any weather. The article is the best discussion of pattern designs ▬ published, with plenty of hints on how to trim a pattern ship. Send for a back issue for $1.00. 60 engine, retracts and four-function radios. (July, 1971, **AAM**) **$3.00**

0424/DRAGONETTE—Compact version of Kraft's Dragon Fli uses hot 40 and flies just like the big one—fast and smooth. Idea) for the latest trend toward smaller-engine pattern ships. See plan number 0111 for the 60-size version. Designer: R. J. Parker. (April, 1972, **AAM**) **$3.00**

1242/CONFIGURATOR III—RC Pattern Ship. With lines reminiscent of Jim Kirkland's famous Intruder, this model is the pinnacle of design evolution. This fuselage is balsa construction, while the wing is foam. One of the smoothest flying ships on the pattern circuit. Retract-equipped. Five-function radios. Sixty engines. Designer: Geroge Buso. (December, 1974, **AAM**) **$6.00**

GO FAST

0831/OLE TIGER—Sleek Quarter Midget racer ■■ fiberglass arrow shafts ■ spars for simple wing construction. Built-up fuselage. Complete with all QM racing rules; by Don Panek. (August, 1973, AAM) **$3.75**

0442/MISSY DARA—QM with high scale fidelity. Integral wing/fuse construction uses foam cores. Either front or rear rotor 15 engine. Designer: Loren Jacobson. (April, 1974, AAM) **$3.00**

SAILPLANES

0152/TONY—*RC slope aerobatic model is ■ spin-off from CL profile designs. Pattern-type performance with three-channel equipment. Can also be flown from hi-start or winch. One-piece construction, 49" span. Designer: Denson, Faure. (January, 1975.* AAM) **$5.75**

0943/MAX-FLY—RC Sailplane. Fourteen ft. of wing on either a balsa or fiberglass fuselage. Designed for maximum contest efficiency. Full-flying stab and torque rod spotter linkage make for a simple radio installation. Second-place sailplane of the '74 WRAMS Show. Three-function radio. Designer: Gil Rifkin. (September, 1974, AAM) **$6.00**

0841/ASTRO JEFF—RC Glider. Winner of the 1973 S.O.A.R. Nats, this 14-ft. soarer has built-up wings, with spoilers. Three extra large plan sheets (almost 45 sq. ft.) illustrate profuse construction details. Either a fiberglass or balsa fuse can be built. Three-function radio. Our best sailplane design. Designer: Jerry Mrlik. (August, 1974, AAM) For balsa fuse version, order 0841A—$16.95. For fiberglass fuse version, order 0841B—$11.00

0436/AAM GLIDER WINCH—Hefty, 6V winch for launching three-lb. RC gliders or on 12V for six-lb. models. Lightweight, uses turnaround pulley. Well-detailed plan. Designer: George Steiner. (April, 1973, AAM) **$2.75**

1013/HI-PRO—Highly proficient slope/thermal soarer. Build several versions from these plans. Balsa wing and glass fuselage. This is the original of the universally accepted Dumas kit. Two-function radios, or three with spoilers. Designer: Harley Michaels. (October, 1971, AAM) **$3.50**

STAND-OFF SCALE

0843/SAAB—*Stand-off Scale. This WWII Swedish fighter is a pusher, with twin tail beams. Of all-balsa construction, the plane can be built in two sizes, for either a .35 or ■ engine. A good choice for getting started in Stand-off Scale. Four-function equipment. Two plan sheets. Designer: Fred Angel. (August, 1974.* AAM) **$4.95**

1103/AKROMASTER—RC scale/stunt model or real aerobatic plane for 45-60 engine. Fast and responsive, easy to make, simple shapes. Designer: Robert Schultheis. (November, 1970, AAM) **$2.75**

1102/AEROBILE—Large scale CL or RC of the famous Waterman roadable plane. Uses 45-60 motor. Wing detachable, car drivable! Large single-sheet plan. Designers: Angel/Aldrich. (November, 1970, AAM) **$4.00**

0904/ANTOINETTE—Signorino/Zundel RC. 98" wing, nearly scale, flies well on .36, like powered glider. Plans—three huge, detailed sheets. (September, 1970, AAM) **$9.00**

SCALE

0941/LEPERE L.U.S.A.C.-11—Scale WWI bipe. Large size (1580" sq. wing area), exact scale model can be built with military or civilian trimming. Fully enclosed engine (60-71 size) in a uniquely molded metal cowl. Model corresponds to ■ full length AAM article on the full-size plane. Four-function radios. Two large plan sheets. Designer: Floyd Carter. (September 1974, AAM) **$10.00**

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0801/WINNIE MAE—Spectacular RC Vega, the one Amelia Earhart flew, for strong 60 engine in 2"-1 ft. scale, foam and balsa, lots of details. By Monty Groves. Two big sheets. (August, 1970, AAM) **$4.50**
Also, special 1⅛" to 1 ft. version, 40s through 60s. Two sheets. Order as No. 0802 (August, 1970, AAM) **$4.25**

0401/D-H ■■ COMET—Scale twin by Skip Williams from Jan., '69, centerspread for two .20s. Fast, stable. Unique enough to gather ■ crowd, yet sensible enough to build as your first twin. (April, 1970, AAM) **$3.75**

(Continued from page 85)

1/8" facing on the wing panel will be resting against the rear spar. The aileron hinges pass through this facing into the upper rear spar.

The wing tips can be added now, followed by 1/16 x ¼" balsa capstrips on all ribs not covered by center section sheeting. After careful sanding, the lower wing panels are ready for joining. The lower wing has a ½° dihedral angle, or ¼" elevation under each tip. Epoxy a 1/16" dihedral brace to both the rear and forward spars.

The upper wing panels are joined through a center section constructed of the remaining ribs. The 1/8" plywood W1s are epoxied between R2 and R3. It is important that W1 is glued on the chord line of R2 and R3, since any deviation will affect the incidence of the upper wing. Epoxy the outer panels to the center section so that R3 butts against the first R4 and all four of the panel's spars butt against R2, and the center section's 5/8 x 1/8" spruce spar fits into the first two R4s.

Now, epoxy scrap blocks of balsa between the spars and W1 to bring the spars in contact with W1. Glue maple blocks to the upper surface of W1 to receive the wing mounting bolts. Use 1/16" sheet balsa to cover the center sections of both wings as shown on the plans and wrap both wings with fiberglass strips at the wing panel joints.

In some Senior Aero Sports the center section of the upper wing carries fuel, so it is a bit thicker than the out-

board panels. This can be simulated by adding a layer of 1/8" sheet balsa to the upper surface of the center section. The bottom of the center section is left open between R3 and R3A to receive the cabane struts. Note that some of the lower rear spar will have to be trimmed to allow proper seating of the wing on the cabane struts.

Before covering the wings be sure to epoxy 1/8 ■ ¼" spruce strips to the spars ■ shown on the plans. These stips serve as mounts for the Proctor strut brackets (Proctor scale accessory No. 315).

Fuselage and Cowl: The basic fuselage is simply a box structure formed from two built-up sides of ¼ x ¼" balsa. A 1/8" plywood doubler is epoxied to the inside of each fuselage side. This doubler supports the firewall (F1), the 1/8" music wire cabane struts, and the landing gear mount.

The basic box structure is formed by gluing F1 and all cross members into position between the two sides. Now all formers and stringers ■ added; the music wire cabane strut is secured with "J" bolts; and the ¼" plywood landing gear mount is epoxied into position. The next task is to install the fuel tank behind F1, followed by the main landing gear which is fabricated from two 3/16" music wire struts.

The gap between the struts is filled with balsa and fiberglassed to simulate Cessna-type landing gear. I avoided commercially available sheet metal landing gear because none was large enough, nor

were the struts narrow enough to give a scale appearance. The 3/16" struts are bolted to the ¼" plywood mount with "J" bolts.

Note that the fuselage doublers are lined with ½ x 3/4" maple rails on the lower edge. These provide a strong gluing surface for the ¼" plywood landing gear mount. Once the internal work is completed, the forward portion of the fuselage is sheeted with 1/8" balsa and a 1" balsa block is added between F4 and F6. After sanding, the cockpit openings are cut from the upper sheeting.

I formed my cowl over a foam mold. I like to work with foam, since it carves and sands easily and is relatively inexpensive. The major disadvantage is that the mold must be destroyed to free the finished component. To build the Senior Aero Sport's cowl, simply laminate foam blocks forward of F2, F3, and F4 to match the approximate shape of the cowl. Three-M's Spray-ment is excellent for laminating foam. Be sure the foam adheres to the fuselage structure *only* at F2, F3 and F4. This will allow easy removal by simply cutting the mold free on that line. If the mold adheres to the doublers or firewall, it may be impossible to remove in one piece. When shaping the foam, try to sand it approximately 1/16" undersize in all dimensions to compensate for the thickness of the fiberglass cloth.

After removing the mold from the fuselage, glue a hardwood strip to the inside. This "stem" can be mounted to a vise to hold the mold while you apply the fiberglass cloth. I applied five layers of medium-weight cloth to the mold, each held in place with 3M Spray-ment. The cloth is then liberally saturated with Hobbypoxy Formula II and allowed to cure. The mold is removed by dissolving it with lacquer thinner. The exterior of the cowl is then smoothed by mounting it on the fuselage and adding a layer of Epoxolite. When the Epoxolite is sanded smooth, the necessary openings for ventilation be cut.

Tail Surfaces: The tail surfaces are formed from light 3/8" sheet balsa. The elevators are joined by a ¼" dowel, and 1/8" masking tape is used under the covering to simulate ribs on the tail surfaces. The wheel pants are carved from laminated balsa. The pant is retained on the axle by a Sig nose wheel steering arm (drilled to receive the 3/16" axle), which is bolted to the plywood insert on either wheel pant. The entire wheel pant is covered with fiberglass cloth and coated with finishing resin or epoxy.

The tail wheel strut is fabricated from .032 K&S aluminum. The "N" struts are built from ½" K&S streamlined tubing. Each strut is cut to length after the wings are bolted into position. The forward and rear struts fit into Proctor strut mounting brackets. The diagonal member is epoxied between the two upright members. When dry, the strut assembly is removed from the brackets; the joints fiberglassed and blended smooth with Epoxolite.

Finishing and Rigging: With the exception of the cowl and wheel pants, my entire airframe was covered with

Silkspun Coverite. Be sure to use an iron that produces enough heat to effectively seal the Coverite. Once the model is covered, the rigging can be fitted. Use white elastic cord for the flying wires. The cord is cut to approximately three-quarters of the distance between the points of attachment. Goldberg "Mini-Snap" nylon clevises are knotted on each end of the elastic cord. The nylon clevises not only simulate the clevises used on full-size biplanes, but allow quick assembly or breakdown of the rigging.

I used Du-Bro metal landing gear straps for anchoring the flying wires to the airplane. The straps are screwed into hardwood in such places ■ the "N" strut attachments or they can be inserted into the wood and epoxied in such places as the fuselage and tail surfaces.

I painted my model with acrylic lacquer plasticized by Southern R/C Product's Flex-All. Two coats of primer were applied and sanded. Then the entire airplane was sanded with three coats of white. After the white had completely dried, I masked for the first trim color, gold.

The checkerboard pattern on the lower flying surfaces was masked by identically cut squares of vinyl contact paper. Avoid applying extremely wet coats of lacquer over the contact paper, as it tends to lift when covered with ex-■ paint. The final color, green, is followed by the addition of pinstripes—black pinstripes on all lines where gold meets white, and gold pinstripes where green meets white. Goldberg's Multi-Stripe tape is recommended. I then added two coats of clear lacquer to seal the finish. You may want to try clear Super-Poxy, since it probably will provide ■ harder finish.

Windshields of .015 clear plastic are attached to the fuselage with Ambroid Cement. Cockpit detail, such as instrument panels and seats, can be added at this point. Another advantage of a large scale model is that the radio gear can be easily hidden to permit ■ unencumbered cockpit. I mounted the servos horizontally under the rear seat. The batteries and receiver were placed just above the landing gear mount, forward of the front cockpit.

FLYING

A reliable radio and engine, coupled with ■ warp-free structure and a properly located CG should ensure a well-flying model. Unfortunately, my first flight ■ not trouble-free, ■ I built my model with scale wing incidence of 2° in both wings. This is far too much incidence for the model, and the Senior Aero Sport staggered into the air at ■ dangerously low airspeed. Even with considerable down elevator, it flew in ■ nose-high attitude. After a full stall landing (literally), I realigned the wing incidence and the Senior Aero Sport has behaved like an airplane ever since. The plans reflect the current setup of 2° in the upper wing and 0° in the lower.

I am using a Fox .78 with ■ 14 x 6 Top Flite prop. This power combination is ideal for effortless takeoffs and large,

(Continued ■ page 92)

graceful maneuvers. While the Sport Biplane event limits engine size to .61, this should present no problem for the Senior Aero Sport. Several engines in the .61 category will fly the model with ease.

One thing is clear about the Senior Aero Sport—it has a definite personality. It relies more on aerodynamic forces than brute power to accomplish its maneuvers. The result is that a realistic style of flying must be employed. The coordinated use of throttle, rudder, ailerons and elevators becomes a necessity, and this is what the Sport Biplane rules seem to have in mind.

I have flown my model from both grass and hard surface runways. Neither presents a real problem, but the model seems to track best on grass. On takeoff, be sure to advance the throttle slowly, holding a slight amount of up elevator during the early part of the roll to obtain positive steering from the tail wheel. As you gain speed, ease off the up elevator so that the model assumes a level attitude. As the engine reaches its peak rpm, add a touch of up elevator and you're airborne. Beware of overcontrolling with the rudder during the takeoff roll and, above all, stay ahead of the airplane—anticipate what it is going to do.

Landings are almost too easy, since the Senior Aero Sport lands more slowly than most pattern ships. In a five-knot wind you could easily trot along next to the model at touchdown. This characteristic can have its drawbacks—it requires that you maintain power until the runway is made, and it is easy to land short with all that drag impeding the biplane's forward progress.

I would be interested in seeing photos of your completed Senior Aero Sport, and will be glad to answer any questions you might have concerning its construction. Address your correspondence to me in care of **AAM**.

PFALZ

(Continued from page 28)

Add any other trim now and lettering or stripes as required.

Radio Installation: The battery and receiver are installed in the nose section, together with the spare wiring and the on-off switch. I gave up mounting the switch permanently on my gliders some time ago (mainly out of laziness), but it does save cutting a big hole in the model, and it also makes it easier to fly two gliders (separately, of course). Rather than swap complete systems, I put two servos in one model, two in another, and then either can be flown simply by transferring battery, plus receiver packages. It does make it a little easier if the switch isn't permanently attached to the model.

The servos are stuck to the plywood plate with servo tape. Don't forget to dope this plate well (or paint it with five-min. epoxy) to provide a good base for the tape. Make up a couple of pushrods from 1/16" wire and 1/4" sq. hard balsa, and connect the servos to the controls. The plan shows the full travel for the rudder and elevator, the next task is to adjust the various linkages until these are achieved. The throws can be revised after some flying experience, if necessary.

Flying: Before leaving the garage/workshop/house and charging off to the flying site, a few simple, preflight checks are required. First, assemble the model and add enough ballast to get the

(Continued on page 101)

MODEL AVIATION
Official Magazine
Editor: Carl Wheeley

AMA NEWS

ACADEMY OF MODEL AERONAUTICS
806 Fifteenth Street, N.W.
Washington, D.C. 20005

World's Largest Sport Aviation Organization

$4,000 Awarded in AMA Scholarships

Congratulations to the Six 1974 Winners

Donald L. Edberg, ($1,000), Covina, Calif., is attending the University of California at San Diego where he is majoring in applied mechanics and engineering sciences. Primarily interested in RC Soaring, in two years of modeling Don founded the Silent Wings Soaring Assn. and achieved Level III in the League of Silent Flight. He also organizes contests for the Pacific Radio Control Soaring Assn., and has won many awards in Soaring competition.

Don is a full-scale enthusiast, with a private sailplane pilot's license, and he's a tennis player. Valedictorian of his Covina High School graduating class, he was school newsletter editor, president of the Math Club, member of the International Club, and took part in band activities. He is a life member of the Boy Scouts.

Allen E. Swanson, ($1,000), Nashville, Tenn., is studying aeronautical engineering at Texas A&M University, and was elected freshman representative to the student council. During six years of aeromodeling he built over 100 models, mostly Control Line, but also a few Radio Control and Free Flight models; he is a member of the B-Liners Model Airplane Club. In competition, including the Nats, he has won numerous awards.

While at McGavock High School he won the Science Chair Award, biology award, belonged to the Math Club, and Beta Club Honor Society, was president of the French Club, won his letter on the track team, and was co-feature editor of the school paper. Active in the community, he participated in the Civil Air Patrol, YMCA, Boys' Club and March of Dimes.

It's easy to get involved in AMA's Scholarship Program. See details on page AMA 2.

Curtis M. Pfarr, ($750), Tacoma, Wash., is at the University of Washington, studying engineering. A modeler for five years, Curtis takes part in Free Flight competition for which he has won numerous honors, including a national record, and qualification for the 1975 FF Team Finals. He is a member of the Kent Strat-O-Bats FF Club but is also interested in Radio Control and Control Line.

At Woodrow Wilson High School Curtis was a member of the National and German Honor Societies, was captain and letterman of the rifle team and president of the Rifle Club. He also enjoys tennis, fishing, boating, photography and full-scale flying.

Lell E. Barnes, III ($500), North Caldwell, N.J., is presently studying at Clemson University, majoring in architecture. He has built more than 200 models, Control Line and Indoor/Outdoor Free Flight, in 10 years, and altogether has won more than 40 competition awards, including the Garden State Circle Burners Club Outstanding Member Award. Especially concerned with helping youngsters get started, Lell received the Walter L. Schroder Outstanding Junior Achievement Trophy for his work with young modelers.

Lell belonged to the Chess Club, the wrestling team, audio-visual team, and the school orchestra while a student at West

Donald Edberg (above right) and Allen Swanson (below right) each were awarded $1,000 AMA scholarships. Curtis Pfarr (below) was a $750 scholarship winner.

Essex Regional High School. He likes sports and the guitar, too, and is an Eagle Scout.

In the Industry Advancement Program of the Building Contractors Assn. of N.J., Lell's concept of a Marine Environmental Center won the 1974 Model Building Competition; his description of the development of that project appeared in the building association's publication. He credits model airplane experience for his knowledge of planning and construction techniques which directed him towards the field of architecture.

Ramon L. Torres, ($500), Hialeah, Fla., an engineering student at the University of Florida at Gainesville, ■ an RC flyer with special interest in Quarter Midget Pylon Racing, Scale and puttering around with an Ugly Stik; in 12 years of modeling he has won many competition awards. He belongs to the Tropic Aeros RC Club.

Ramon was valedictorian of his Hialeah High School graduating class and was a member of the National Honor Society. A music lover, he played the cello in the school orchestra and clarinet in the band.

Joseph E. Rotunda, ($250), Vero Beach, Fla., is majoring in aeronautical engineering at Embry Riddle Aeronautical University; he graduated from Vero Beach Senior High School. He is ■ member of the American Institute of Aeronautics and Astronautics (AIAA). A competitive Control Line flyer, he has won numerous awards with some of the 31 models he has built in his first five years as a modeler. Joseph is active in the Piper Explorers and the Vero Beach High Flying Club; he works part time in the hobby department of a variety store.

1975 Scholarship Program

It's easy to enter, and if you know a young person who might be interested and qualified—but who doesn't receive this publication—please tell him about it. Write to AMA HQ, 806 Fifteenth St., N.W., Washington, D.C. 20005, and request a scholarship application. To be eligible a current AMA member must: (1) have flown a model ■ an AMA sanctioned competition in 1974 or 1975, prior to submitting the application; (2) be ■ high school graduate in 1974 or 1975. Applications must be completed and returned to AMA HQ by May 31, 1975.

In selecting recipients, a number of considerations are made: activities, class rank, grade average, national test results. The most desirable candidate is one who takes part in a variety of modeling, school and community activities, as well as being academically inclined. Although high achievement is important, the well-rounded individual may well be more qualified than one who excels only in grades or only in modeling.

The amount and number of scholarships varies, dependent to a large extent upon the number of applications, their qualifications, and the amount of money available in the Scholarship Fund. Applications are considered and evaluated by the AMA Scholarship Committee (for the awards announced here, consisting of Robert Stalick, Albany, Ore., chairman; Cliff Telford, Bethesda, Md.; John Worth, AMA HQ) which makes recommendations to the Executive Council.

Lell Barnes (above left) ■■■ Ramon Torres (below left) each received $500 to help further their educations while Joseph Rotunda (below) was awarded $250 in the 1974 program.

Background

Matty Sullivan (AMA Life member, former Nats CD, manufacturer of Pylon Brand Products) was the initiator of the AMA Scholarship Program, having made a substantial contribution for this purpose some years ago. The Executive Council, which is the AMA policy-making body, followed suit and authorized an apportionment of dues and solicitations for additional contributions to fund the program on a continuing basis.

The first scholarship awards were made in 1970. Although it was originally planned that only one award would be made, two young people were given $1,000 each: Bill Reed, Raytown, Mo., and Susan Weisenbach, Cleveland, Ohio. This dual award was made in recognition of the outstanding scholastic and modeling achievements of each. A new era began for AMA, giving the members an active part in furthering the interests of their hobby, and showing the organization as one interested in its young members—beyond the building and flying of model airplanes.

In 1971 the Scholarship Program had three winners: George Pharr, Montgomery, Ohio ($1,000); Richard Leidner, Miami, Fla. and Robert Hanford, Tulsa, Okla. ($500 each).

Five people benefited from the 1972 Scholarship Program: William Booth, Fresno, Calif. ($1,000); Randy Wright, Media, Pa. and Whit Stockwell, Encino, Calif. ($750 each); Ron Ganser, Pittsburgh, Pa., and Michael Kuehne, Bryan, Ohio ($500 each).

God's Gift to Aeromodelers—Balsa Wood!

PRESIDENT'S MEMO

AMA President John Clemens, ■ right in background, chats with *Model Airplane News* Publisher Walt Schroder during the RC International Tournament of Champions which ■■■ held ■ Las Vegas in December under sponsorship of *MAN* and Circus Circus Hotel/Casino/Spa. In foreground of this photo by Alex Chisolm ■■ Benny Kjellgren, right, and his unidentified assistant. Hanno Prettner of Austria, age 22, won the first place trophy and $5,000 cash prize which went with it; he also received an extra $1,000 for obtaining the best single flight score.

To say that the Academy of Model Aeronautics is built of balsa wood would seem to be pretty corny, but how nearly true it is. Balsa has been the main building material of the art of aeromodeling for as far back as most of us can remember. It certainly makes one wonder, were there no balsa wood, if today there would be an Academy of Model Aeronautics. Most likely not, or at least not as we know it. To make a weak joke, aeromodeling probably would never have gotten off the ground without God's gift of balsa wood.

Since it was the traditional "blessing counting" time of year when this was written, and I was giving thanks for at least my share of the balsa crop, you might enjoy sharing some facts about this superlight wonder-wood. It deserves not being taken for granted!

It is hard to believe that balsa, famous for its lightness and softness, is actually classified as a hardwood. Until it is harvested and properly dried, it is quite hard and quite heavy. It becomes light when the wood is dried and the moisture in its cells is replaced with air. Processing the harvested wood into its most useful and uniform grades is done by kiln (oven) drying to reduce the moisture content to exact percentages.

Nearly all balsa wood comes from the South American country of Equador, with Costa Rica running a distant second. Equador is a small country on the upper west coast of South America between Columbia and Peru—about the size of Colorado. The population of Equador is over three million, or about the same as Tennessee. Equador is directly on the equator, with its trees and vegetation growing very rapidly in the tropical rain forest. Balsa trees are cut mainly along the banks of Equador's rivers and then floated down to sawmills in huge rafts.

With the ever increasing use of this lightest-of-all wood, the trees must be cut farther and farther upstream, and farther from river banks. This increasing difficulty has its effect on the price of the ultimate product. In the early days of our use of balsa for modeling, some of the trees actually were harvested by headhunters, and there is a remote possibility that some of this is still done.

Equador remains a pretty primitive country, with about 50 percent illiteracy and schools available to only 10-20 percent of its youth. Processing and exporting of balsa is mainly from Equador's main port city of Guayaquil (pronounced Kwy-uh-keel). Other important products of the country shipped through this port are bananas, cacao and coffee. The money unit of Equador used in international exchange is the "sucre."

Processed balsa is the lightest of all commercial woods, but its density is very fickle —varying from about four to 40 pounds per cubic foot. It is half the weight of cork, making it ideal not only for model airplane construction but also rafts, floats, life preservers and buoys. Balsa is about one-fourth the weight of red cedar or spruce, and one-ninth the weight of hickory or dogwood. The cellular structure of balsa, with its millions of tough fiber-connected air cells, makes it ideal and widely used as an insulating material in incubators and refrigeration. A present acute shortage of balsa, driving up the price to its highest level in history, is said to have been aggravated by its use ■■ ■ heat-insulating material in the hull walls of some of the new giant ocean-going chemical tankers, where chemicals such as sulphur are kept in hot solution during the ocean journeys.

Balsa wood is ■ close relative of mahogany, with similar grain and fiber structure. The balsa tree has large leaves and large ivory-colored vase-shaped flowers that produce its fruit and seeds. It is classified as a hardwood tree, strangely, because it drops its leaves instead of retaining them in the manner of evergreens.

Balsa used in aeromodeling is usually in the density range of from four to nine pounds per cubic foot. The softest wood is usually used for blocks to be carved. Medium weight wood is usually cut into sheets, and the hardest wood is processed into the many strip sizes, with the very hardest used for strips of smallest cross-section.

Balsa is a near-magic material in the hands of the aeromodeler or any handicrafter because of its ease of cutting, sanding and gluing. But it is even more ideal as a basic material to acquaint young hands with handling wood and construction problems. It lets ■ young person master the use of a sharp blade without having to use great exertion, thereby minimizing the danger of accidents. The porous nature of balsa makes it, probably, the easiest of all woods to glue—again making it an ideal handicraft material.

Watch the look on a boy's face as he dreams about how his model airplane is going to fly, and try to imagine just where aeromodeling would be, if at all, without the blessing of this amazing and versatile building material.

Please, now, give thanks with me for balsa wood, for I believe the Academy of Model Aeronautics is truly built of it!

John E. Clemens
AMA President

FAI Rules Changes

The 1974 annual meeting of the Federation Aeronautique Internationale (FAI) Committee for International Aeromodeling (CIAM) was the largest ever, with 29 countries represented. The U.S. delegation was led by President John Clemens and included John Spalding, voting delegate and AMA Dist. IV V.P.; Dan Pruss, CIAM RC Soaring Subcommittee member and LSF president; and John Worth, CIAM secretary and AMA executive director. A number of changes were made to the FAI competition rules during the December 5-6 meetings in Paris, the most significant of which are reported here. For U.S. competition purposes, all of the changes were effective January 1, 1975, and all except for FF FAI Power similarly were effective for international competition purposes.

Control Line

Coupled Lines for FAI Speed and Team Race, including intentional twisting of the lines, are banned. Stunt second attempts must be made immediately after the first attempt or immediately after the next three competitors have flown. To indicate when flight timing starts, a hand signal is substituted for the previous start by prop flipping. The winner will be determined by adding the best finals flight to the best qualifying flight. **Combat** redraft rules were approved, incorporating U.S. proposals regarding streamer marking and working of the pyramid system.

Free Flight

Coupe d'Hiver original weight rules were reinstated: 80 grams minimum total, 70 for airframe and 10 for rubber. **World Championships** events may begin before sunrise and may be interrupted during the day if high winds and high thermal activity cause retrieving problems. **FAI Power**, effective in 1976 (in 1975 for U.S. competitions), will have the engine run reduced to eight seconds and return to the former flyoff procedure of increasing max flights in one-minute increments.

Indoor

Attempts. A new rule is that another attempt may be made for any flight of 30 seconds or less duration. **Flight Termination.** If a model touches the floor, the flight is terminated only if the model comes to rest.

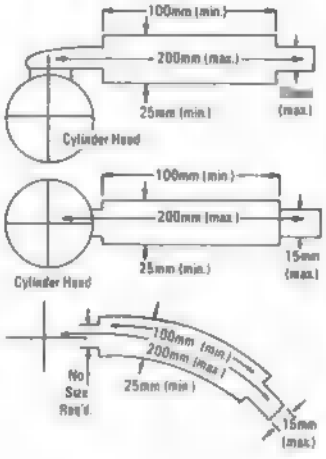
Radio Control

Aerobatics. The maneuver pattern is slightly modified, with half-rolls being substituted for full rolls in the Top Hat, and exchanging the sequence of the Running 8 and the Rolling 8. The pilot, rather than the helper, is now required to call maneuvers, but he doesn't have to say when the maneuver starts. Framing angles for judging are designated as 90 degrees (45 degrees each side of center) for horizontal viewing and from ground to 60 degrees for vertical viewing. Venturi or flow-through (open front end) type silencers are banned.

Soaring. The provisional rules were changed to official status, and an offer from South Africa to host the first Soaring World Championships in 1976 was tentatively approved—with final decision to be made at the CIAM officer meeting in April 1975. For both Thermal and Slope Soaring, signaling or talking to the pilot by helpers during the flight is no longer prohibited.

Thermal Soaring. U.S. proposals adopted: an attempt can be repeated in case of a launching system malfunction; launch location is defined; the maximum stretched length of launch line is defined as 200 meters; the requirement for flight annulment after 60 seconds on the launch line is deleted; a 150-meter limit is placed on hand towing movement during launch; all references to *working time* deleted. Other approved new rules: high-start and catapult-type lines must have one end attached to the ground; flight ment is defined to be when the towline releases or the engine (for motorgliders) has stopped.

Pylon Racing. A fuselage cross-section area rule was added, requiring a minimum of 100 sq. cm. (15.5 sq. in.). Landing gear must have a minimum track of 300mm (11.8 in.), and wheels must have a minimum thickness of 18mm (.7 inch) for at least one-third of the diameter. A cockpit must be provided of minimum size to allow a scale pilot head of 5cm (1.97 in.) from chin to top of head and with clear vision forward and to the side. More specific silencer size requirements were added as per the following sketches.



Scale

A dummy pilot is now required for open cockpit models, but the dummy pilot is not judged unless requested by contestant. Two separate scale rulers are now permitted. Cockpit/Cabin scoring has been slightly downgraded in favor of increased points for Finish/Color/Markings. RC model weight limit has been increased by stating the 5kg limit is *without* fuel; smaller scored landing circles were approved as per RC Aerobatics rules, and the sizes of circular maneuvers were defined more precisely. For CL, longer lines were approved for multi-engine models.

CL Coupled Lines

These are control lines (two-wire type) which are tied together in various ways so that one line trails closely behind the other while in flight, thereby reducing drag on the lines and increasing speed close to 10%. Illustrations of several types of line couplers were printed in the December *AAM*, page 50.

Since introduction of coupled lines last summer, there has been much controversy. Some have wanted an immediate ban of coupled lines for AMA competitions, while others see the potential of interesting new people to competition, particularly CL Speed, via two lines made competitive with monoline. Subsequently the FAI has banned coupled lines from its World Championships rules for CL Speed and Team Race.

The AMA Contest Board also is taking action which could result in banning coupled lines from one or all AMA competition events. Proposals for quick effect of such ban(s) were printed in AMA's December *Competition Newsletter*, giving many interested modelers opportunity for inputs before the CL Contest Board decides the matter by mail vote in the first half of February.

Indoor and Outdoor FF Team Selection Programs Approved

Programs proposed by AMA committees for FAI Indoor and Outdoor FF Team Selection have been endorsed by more than a two-thirds majority of previous program participants and approved by AMA President John Clemens. In announcing approval, Clemens saluted all those who participated in development of the programs and noted that this was the first successful result of a new direction for AMA team selection efforts, with responsibility delegated to those directly involved and willing to comply with majority desires.

Space presently doesn't allow presentation of all program details, but we'll skim the surface of the most important information. For full details please send a request to AMA HQ, stating the program information desired (Indoor or Outdoor FF), and include a pre-addressed and stamped envelope.

Indoor

The program to select the three-man team to represent the U.S. in the 1976 Indoor World Championships (tentatively slated for England) involves eight regional contests in 1975 and a single-site Team Finals at Santa Ana, Calif., in September 1975. Team members will be determined based upon best score for three rounds in each of the program entrant's best two regional contests *and* best three rounds in the Team Finals; the two regional contests each weighted a maximum of 20% of the maximum points obtainable and the Team Finals at 60%. The winner of each round is awarded 100 points, and others receive points in proportion to their flight times.

All AMA members who have (or obtain) the FAI stamp are invited to participate in the regional contests of the program which will consist of two each in four areas: East Coast, West Coast, Midwest and Southwest. The program fee for each regional contest entered is $10, and a team member aspirant may enter as many as he chooses, but qualification for the Team Finals may be accomplished by performance in just two of the regional contests. Program entrants whose two-regional-contest score is within 80% of the best nationwide two-regional-contest score will be qualified to participate in the Team Finals—for which there is a $20 entry fee. (Senior AMA members pay half of the fees stated for entry; Juniors are free.)

Full air fare to the Team Finals for the top three nationwide two-regional-contest scorers will be provided from program entry fees, if possible, and the goal is to pay half fare for 4th through 6th and quarter fare for 7th through 9th. Those nearby to the Team Finals won't participate in the distribution.

Outdoor FF

Three-man teams each for Wakefield Rubber, A-2 Towline Glider and FAI Power for the 1977 Free Flight World Championships (tentatively planned for Finland) will be selected in a program involving local Qualifying Trials and regional Semi-Finals in 1975, and a single-site Team Finals in 1976.

All AMA members who have (or obtain) the FAI stamp are invited to participate in the local Qualifying Trials which began on January 1 and continue up to two weeks prior to the 1975 Labor Day weekend. Entry requires a one-time payment per event of $5 if in advance by mail to AMA HQ, or $6 if paid at an AMA sanctioned Qualifying Trials (entry by Junior members is free, but must be requested); either method allows unlimited attempts to qualify for the Semi-Finals, requiring a seven-flight total of 14 minutes or more (for FAI Power, with the new 8-second engine run).

A number of regional Semi-Finals will be held throughout the country on Labor Day weekend of 1975, requiring a program fee of $12 per event. The Semi-Finals will be run for eight rounds by procedures very much like World Championships. The number to be advanced from the Semi-Finals to the Team Finals is by a formula to produce 30 Finalists, nationwide, per event; a Semi-Finalist who achieves 95% of the winning time at his Semi-Final also is advanced.

The Team Finals is planned for Labor Day weekend of 1976 at an East Coast location if a suitable site is found to be available. The entry fee per event is $15 for those who qualify from Semi-Finals as described above and also for 1975 U.S. team members, who are automatically eligible. Procedures similarly will be very much like World Championships, except for eight rounds and a "forced flyoff" procedure in which will participate the top six (or all those within 98% of the maximum achievable time for the regular rounds flown). Team members will then be determined by adding regular round time to flyoff time.

A good share of the travel expense to the Team Finals will be reimbursed from monies accumulated from program entry fees at all levels. The goal is to have equalization of travel costs to the Team Finals irrespective of where the Finalist lives or how he places in the Semi-Finals.

Background

The concept by which these programs were developed was proposed by the National Free Flight Society and approved by the AMA Executive Council in March 1974 on a two-year trial basis. The concept included Indoor and Outdoor Committees with members in each of the 11 AMA districts as recommended by the NFFS, approved by the AMA district vice-presidents and ratified by past program participants. The resulting committees: Indoor—Erwin Rodemsky (chairman), C.V. Russo, Bucky Servaites, Harold Crane, Dave Linstrum, Al Rohrbaugh, Dick Kowalski, Bud Teany, Ted Gonzoph, William Gaiser and Ray Harlan; Outdoor—George Xenakis (chairman), Frank Parmenter, Bob Hatschek, Tom McLaughlan, George Batiuk, Paul Crowley, Dick Lyons, Rol Anderson, Bob Sifleet, Don Krus and Bob Stalick.

A key element of the concept was an in-person meeting of each of the committees, with financing for attendance coming half from the NFFS and half from AMA via matching funds. The Indoor Committee met on September 14-15, and the Outdoor Committee met on September 20-21—both in Detroit. During these meetings many ideas were aired, and there resulted agreement for proposed programs essentially like those approved and reported here.

Following the Detroit meetings, the committees distributed their proposed programs to past entrants in the form of an opinion survey. Response was strong in favor of the proposals, but some flaws were pointed out which the committees felt were in need of correcting. Revisions were made, and past program entrants were again polled. In both programs the response was overwhelmingly in favor: 63 to 8 for Indoor, and 157 to 32 for Outdoor FF.

Chartered Clubs

Where is your nearest flying field? Where can you find help with your modeling projects? Who are the modeling leaders in your area? Who can give you good advice about the best kind of planes and equipment? Who can help you find answers to technical questions about models and equipment? Where can you find a test pilot? Who has the news?

If you don't already know the answers to these questions, you will find this listing of 1974 AMA chartered for 1975) extremely useful. Contact the person listed (usually the secretary) of the nearest club in your modeling interest to obtain times and places for meetings and flying sessions, and details for joining.

The principal kind of model interest for each club is shown by a one-letter code: R—Radio Control, C—Control Line, F—Free Flight, S—Scale, I—Indoor, M—Multi-interest.

Newsletters and their editors are included, also, directly beneath the clubs they serve; others are shown at the end of state listings. Those for national special interest groups will be listed in another issue.

The newsletters are coded to show several kinds of information. Where known, the numerals indicate the number of issues published each year; X means that the newsletter editor desires to exchange his newsletter with editors of others; P means that the newsletter may be purchased by non-club members. In initiating exchange or purchase, deal directly with the editor shown. (In some cases information was not available at press time concerning availability for exchange or purchase, and key information is shown.)

If a newsletter exists that isn't shown, it's most likely that AMA HQ isn't receiving copies. AMA HQ is interested in receiving all club newsletters, as this is an excellent way of keeping abreast of member likes, dislikes, and activities.

The list includes over 1,000 AMA Chartered Clubs having a total of more than 31,000 individual AMA members, and over 250 newsletters. If the club to which you belong is not AMA chartered, send to AMA HQ for free club charter information. All chartered clubs are provided with liability protection, and they may also obtain low cost liability protection for owners of flying sites (and other facilities used by the club)—a tremendous help in obtaining and keeping precious space for model flying.

ALABAMA

Bessemer RC Club, M.B. Watkins, 4104 Avenue H, Fairfield 35062 . . . . . R
Birmingham Aero [illegible]elers, James Weems, 1618 Roseland Dr., Birmingham 35209 . . . . . R
Birmingham RC Assn., Fred Watkins, 2524 Belle Terre Dr., Birmingham 35226 . . . . . M
Bham RC News, Henry S. Arnold, PO Box 20027, Birmingham 35216 . . . . . 12, X
Blount County Flying Club, Jerry Woodard, 101 1st Ave. E., Oneonta 35121 . . . . . M
Decatur MAC, [illegible] L. Stone, [illegible] Spring Ave. SW, Decatur 35601 . . . . . R
Ft. Rucker RC Club, James Morgan, 105 Sweet Gum Pl., Enterprise 36330 . . . . . R
Gadsen Aero Modelers Assn., Colon Ellis, 1806 McKinley Ave., Gadsen 35901 . . . . . M
Gulf Coast RC Inc., William Owen III, 102 Llewelyn Ct., Mobile 36608 . . . . . R
[illegible] *Flightbag*, [illegible] Sholes, 4306 Nicholl Drive, Mobile [illegible] . . . . . 12, X
Huntsville Aeromodelers, Tom Killough, 118 Roberts Rd. SE, Huntsville 35802 . . . . . M
MAC of Huntsville, T. J. Heplar, 808 Rigel, Rt. 5, Box 336-D, Decatur 35601 . . . . . M
MACH News, Dick Hall, 604 Box Street, Athens 35611 12
[illegible] City Radio Controllers, Eddie Monroe, 1120 Ridge Dr., Weaver 36277 . . . . . R
Quad Cities Radio Club, Ken Waddell, Rt. 7, Florence [illegible] . . . . . R
Radio Aero Modelers of Montgomery, James Anderson, 1258 Adell St., Prattville 36067 . . . R
Rocket City R[illegible]. Valerie Conklin, 11312 Crestfield [illegible] SE, Huntsville 35803 . . . . . R
Rocket City RC Newsletter, R. Noulin, 1924 Burlingame Dr., Huntsville 35803 . . . . . 12, P, X
Wiregrass RC Club, James C. Morgan, 105 Sweet Gum Place, Enterprise 36330 . . . . . M

ALASKA

Capital City RC Club, John Dawson, P.O. Box 675, Juneau 99801 . . . . . M
Fairbanks Area RC Society, Brian Gray, 500 Ketchikan Ave., Fairbanks 99701 . . . . . R

ARIZONA

Air-Zona MAC, Tom Kilday, 6544 N. 13th Street, Phoenix 85014 . . . . . M
Arizona RC Society, Walter Teel, 11017 [illegible]. 38th Place, Phoenix 85028 . . . . . R
Desert Flyer, Wes Schroder, 2918 Country Club Way, T[illegible] 85282
Arizona Soaring Club, Darrell C. Boyd, 1010 E. 9th Place, Mesa 85028 . . . . . R
[illegible] Choppers MAC, Bill Roberts, 3733 [illegible]. Estrella, Tucson 85715 C
CCMAC News, Jan Hagerlin, 8331 E. 3rd Street, Tucson 85710
Condors of Luke AFB, William Palmisano, 6226 W. Elm Street, Phoenix 85033 . . . . . M
Fleagle Gram, David K. Graska, 1325 Kachina, Glendale 85307 . . . . . 12, X
Dune Dusters RC Society, Tom King, 3601 3rd Place, M[illegible] . . . . . R
Mesquite Modelers of Sierra Vista, L. White, 48th Engr. Det., Ft. Huachuca 85613 . . . . . R
Miniature Aircraft Pilots Assn., R. Magouirk, 8645 E. Va. Ave., Scottsdale 85257 . . . . . R
MAPA Vector, Donald E. Rhoades, 1268 E. Alameda Drive, Tempe 85282
Southern Arizona Modelers, Dave W. Cody, 1715 South Winstel, Tucson 85713 . . . . . R
Tri-City Flying Team, Monroe Sledge, 1755 W. Auburn, Mesa 85201 . . . . . M
Tucson RC Club, [illegible] Perrett, 9311 [illegible]. Lurlene Drive, Tucson 85730 . . . . . R
Other Newsletter
Phoenix MAC Newsletter, Robert C. Roden, 7738 N 32 Drive, Phoenix 85021

ARKANSAS

Fayetteville Aeromodelers, Buster Ashmore, 620 W. Poplar, Rogers 72756 . . . . . R
Ft. Smith Flight Masters, Joe Batson, 1923 [illegible]. 48th Terr., Ft. Smith 72901 . . . . . R
Flight Plan, David Jamell, Box 6087 S. Fort Smith Sta., Ft. Smith 72901
[illegible] Arkansas RC Society, James P. Winburne, 2521 Blackwood Road, Little Rock 72207 . . . R
Pine Bluff RC [illegible] [illegible]hael Waymack, 2300 Dianne, Pine Bluff 71601 . . . . . [illegible]

CALIFORNIA

American Model Airport Assn., Robert Gross, 625 East Monterey Road, Corona 91720 . . . . . R
Antelope Valley Tailwinds, Jim Artz, 5031 W. M-4, Quartz Hill 93534 . . . . . M
Auburn RC Modelers, Kevin [illegible]. Webb, P.O. Box 1643, Auburn 95603 . . . . . R
BARKS Inc., Donald R. Boggas, 1400 Duke Drive, Bakersfield 93305 . . . . . M
Barstow Desert Cadets, Ronald Stradling, 25347 Jasper Rd., Barstow 92311 . . . . . R
Bay Area Radio Aero Modelers, John Montesa, 700 Richmond St., El Cerrito 94530 . . . . . R
B.I.R.D.S. Inc., C.B. Smith, 4341 Graywood Avenue, Long Beach [illegible] . . . . . R
[illegible] *Eye Views*, William O. Simpson, 7413 Via Lorado, Palos Verdes Peninsula 90274
Black Bart Flying Club, Norman Van Galder, 21040 Railroad Ave., Gayerville 95441 . . . . . R
Cactus Clippers, Edwin Erfurth, 16171 Pamela Drive, Victorville 92392 . . . . . M
Camarillo Flying Circus, Randy Wilson, 557 South Arcade, Ventura 93003 . . . . . M
Capitol Condors, Robert M. Fallon, 2667 61st Street, Sacramento 95817 . . . . . F
Central Valley RC Club, Dell Henry, 310 South Crespi, Exeter 93221 . . . . . R
Chico RC'ers, Mark Jensen, 2 Begonia Lane, Chico 95926 . . . . . R
Chula Vista Model [illegible] RC Club, Russell Rhue, 1064 4th Ave. #1301, Chula Vista 92011 . . . . M
Conejo RC Modelers, Sam Phillips, 2117 Sycamore Dr., Simi 93065 . . . . . R
Conejo RC Modelers News, John Brokaw, 950 N. Woodlawn Dr., Thousand Oaks 91360 . . . 12
Cordova [illegible] Masters, Tony Martin, PSC Box 679, McClellan [illegible] 95652 . . . . . R

Corona Model Airport Assn., Johnny Janssen, 719 E. Francis, Corona 91720 . . . . . M
Crash Crew Aeromodelers, Jim Levell, 313 S. Ditmar, Oceanside 92054 . . . . . M
Delta Valley Modelers, Al Garavaglia, 2114 Gardena Ave., Stockton 95204 . . . . . R
Diablo Valley [illegible]C'ers, Frank J. Aiello, PO Box 1084, Concord 94522 . . . . . R
Pattern Patter, Robert Billeci, 3055 Treat, #1, Concord 94518 . . . . . 12, P, X
East Bay RC'ers, Gary J. Loundagin, 8560 Deervale Rd., Dublin [illegible] . . . . . R
Carrier, Glenn Carter, 2020 Gill Port Lane, Walnut Creek . . . . . 12, P, X
Eastern Sierra Flyers, Robert Danks, P.O. Box 1026, Bishop 93514 . . . . . R
Eureka RC Club, Steve Benson, 3168 Prospect St., Eureka 95501 . . . . . R
Flying Fools, Robert Hoffman, Jr., 10904 Cave, Bakersfield 93306 C
Fort Ord RC Modelers, Michael P. Waite, 989 Leahy Pl., Monterey 93940 . . . . . R
Fort Ord RC Modelers Newsletter, Michael P. Waite (see above)
Fresno Gas Model Club, Bill West, 4733 E. Vosser, Fresno 93703 . . . . . F
Fresno Model Club News, William P. Booth, 2937 E. San Gabriel, Fresno 93276 . . . . . 12, P, X
Fresno Radio Modelers, Patricia A. Baroff, 727 West Sierra, Fresno 93704 . . . . . R
Watts New, Roy [illegible]. Schlotthauer, 2344 E. Indianapolis, Fresno
Great Western RC'ers, Joel Peterson, 8610 [illegible]. Rio Vista, Reedley 93654 . . . . . M
Harbor Soaring Society, Hans Langer, 10260 Garrett Road, Stanton 90680 . . . . . R
Hi Desert Aero Barons, Douglas Reeb, 56778 Joshua Dr., Yucca Valley 92284 . . . . . M
Hueneme Stick & Rudder Club, Donald Thompson, 320 Del Sur Way, Oxnard 93030 . . . . . M
Junior Birdmen, Richard Miller, P.O. Box 2196, San Leandro 94577 . . . . . M
Kings County RC, William R. Theis, 1155 Lessen Drive, Hanford 93230 . . . . . R
Long Beach Glider Guiders, Ken Lavender, 4307 W. 168th St., Lawndale 90260 . . . . . R
MARKS, Robert Peterson, 421 Nottingham Drive, Redlands 92373 . . . . . R
Marin RC Group, Ray Compton, 1108 Elm Drive, Novato 94947 . . . . . R
Max Men of So. California, Al Hotard, 1012 Oamato Drive, Covina 91724 . . . . . F
Merced County RC Club, Edwin V. Wood, 1820 Yosamite Pkwy., Merced 95340 . . . . . R
Mission Bay Prop Twisters, James Peterson, 1605 Borane St., [illegible] Diego 92111 C
Model [illegible]sters, Richard L. Stark, 3360 Hill St., Huntington Park 90255 C
Modesto RC Club, Bruce G. Chittenden, 1989 Shushan Dr., Ceres 95307 . . . . . R
North Bay Soaring Society, William A. Pe[illegible] 25 Rudnick Ave., Novato 94947 . . . . . R
Northrop Modelers, Earle D. L'Homme, 5008 [illegible]. 129th Street, Hawthorne 90250 . . . . . R
Nostalgia Model Aircraft Club, David Ross, 2320 N. Elmdale Ave., Simi 93065 C
[illegible] 49'ers, David W. Fitzgerald, 3933 Kingridge Dr., San Mateo 94403 C
Oakdale Aeroknuts Flying Club, Tom Barry, 636 West G St., Oakdale 95361 . . . . . M
Oakland Cloud Dusters, Garry Geraghty, 2858 Pinecrest Ct., San Jose 95121 . . . . . F
Palomar RC Flying Club, T. Granger Williams, 181 Pawnee St., San Marcos 92069 . . . . . R
Pasadena Soaring Society, Howard W. Humphrey, 4457 Belair Dr., La Canada 91011 . . . . . R
Peninsula Channel Commanders, James E. Alley, 3004 Hillside Drive, Burlingame 94101 . . . . . R
PCC Newsletter, Bill Wild, 265 Catalina Drive, Pacifica 94044 12
Pioneer RC Club, L.E. Stephenson, 1006 Westwood Dr., [illegible] Jose 95125 . . . . . R
Modulator, Thomas Minger, 725 E. 4th Avenue, San Mateo 94401
Pomona Valley MAC, John Cragh, 5816 Denver, Montclair 91763 . . . . . R
Quarter Midget Racing Club, George Kurrack, 1773 N. Fern St., Orange 92667 . . . . . R
Radio Aircraft Modelers, Manuel Madril, 811 [illegible] Carrito Way, Gilroy 95020 . . . . . R
Red Bluff RC Club, Steven L. Osburn, 1640 Walnut Street, Red Bluff 96080 . . . . . R
RC Bees, Jack Holmes, 15707 [illegible]. Imperial Hwy., Suite D, La Mirada 90638 . . . . . R
Bee Sting, Tom E. Harper, 2640 [illegible]ide Avenue, Orange 92667
RC Bees of Santa Cruz County, J. Nohrden, 116 Prospect Ct., Santa Cruz 95060 . . . . . R
Redding Radio Control Club, Fred Hunt, 812 Fell Street, Redding 96001 . . . . . R
Redwood Modelers, Roy Speights, 316 Boyce St., Santa Rosa 95401 . . . . . R
Riverside RC Club, George Jenkins, 6320 Sylvan Dr., Riverside [illegible] . . . . . R
Rockwell Int'l Flightmasters, Jack McCracken, 15522 Lofloss Ave., Norwalk 90650 . . . . . S
Flying Scale News [illegible]. *Views*, Fernando Ramos, 19361 S. Mesa Drive, Villa Park 92667
Sacramento [illegible] Barons, Richard B. Jonas, 728 Etafa St., Roseville 95678 . . . . . R
Sacramento Valley RC Club, William Toland, 6359 Tupelo Dr., Citrus Hts 95610 . . . . . R
San Diego Drones, Cary Toragood, 8531 Carlton Oaks Dr., Santee 92071 . . . . . R
San Diego Orbiteers, Bob Beecroft, 4475 Utah St., San Diego 92116 . . . . . F
El Torbellino, John Oldenkamp, 654 Indio, San Diego 92101 . . . . . 12, P, X
San Diego RC[illegible] League, Francis E. Morris, 3436 Elliott Street, San Diego 92106 . . . . . [illegible]
San Diego RC League Newsletter, Robert Bartels, 840 Durward Street, Chula Vista 92010
San Fernando Valley [illegible] Flyers, Ron Clem, 3826 Albright, Los Angeles [illegible] . . . . . R
Valley Flyers Newsletter, [illegible] Owens, 8469 Day St., Tujunga 91042 . . . . . 12, X
San Fernando Val. Silent Flyers, P. Neuschatz, [illegible] Seattle Dr., Los Angeles 90046 . . . . . R
Silent Flyer!, Edward Slobod, 9626 Jullico Avenue, Northridge 91324
San Gabriel Valley RC League, Ed Lennan, 15107 Robles Ave., Hacienda Hgts 91745 . . . . . [illegible]
Interference, Dan E. Beebie, II, 9014 Birchleaf Street, Downey 90240
San Joaquin RC Modelers, Will Portugal, 3435 Marfargoa Rd., #31, Stockton 95206 . . . . . [illegible]
San Jose Wavemasters, Harold Yates, 6100 Monterrey Rd., San Jose 95119 . . . . . [illegible]
San Jose Wavemasters Newsletter, Harold Warner, 859 Sunnyoaks Ave., Campbell 95008
Santa Barbara RC Modelers, Dave Sanchez, P.O. Box 6305, Santa Barbara 93111 . . . . . R
Update, Robert Eldridge, 1144 Portesuelo Avenue, Santa Barbara 93105 . . . . . 12, X
Santa Maria Valley Flyers, Robert L. Angel, 1001 Patterson Rd., Santa Maria 93454 C
Valley Flyer, Robert L. Angel, (see above) 12
San Valeara MAC, Robert G. Ohly, 9425 Olney Street, Rosemead 91770 . . . . . F
Satellite, Ralph I. Prey, 4858 W. 97th Street, Inglewood 90301
Sierra Flyers, James Kitchen, 1377 Geneva Avenue, Yuba City 95991 . . . . . R
Silent Few Soaring Society, Joe Malloy, [illegible] South Friends Avenue, Whittier 90602 . . . . . R
Sil[illegible] Wings Soaring Assn., Tim Bitson, 1441 Farrell, Pomona 91767 . . . . . R
Simi Valley Fliers, Donald [illegible]. Scott, 1254 Royal Ave., Simi Valley 93065 . . . . . M
Skyburners, Don Wise, 15317 Leahy Street, Bellflower 90706 C
Sky Hoppers of Orange County, Kenneth Bauer, 827 Monroe Avenue, Orange 92667 . . . . . F
SHOC Talk, James Scarborough, Box 393, Lawndale 90260
Sky Kings, Sam Sciacca, 1631 South Burke, Visalia 93277 . . . . . M
Slo Flyers, James Granflaten, 1120 Lakeview, [illegible]an Luis Obispo 93401 . . . . . R
Soaring Union of L.A., Thomas Chant, 619 Washington St., Marina Del Ray 90291 . . . . . R
South Bay Airmasters, Gary Sauder, 2304 Redondo Beach Blvd., Gardena 92047 C
South Bay Soaring Society, Kirby Parker, 739 Silver Pine Court, Sunnyvale 94086 . . . . . R
Southern Alameda County RC, Jan Stillwell, 728 Lippert Ave., Fremont 94538 . . . . . R
SACRAT, Joan & David Shirley, 39723 Plumas Way, Fremont 94538
S. Calif. Aero Team., Ross Steckel, 7437 Collett Ave., Van Nuys 91406 . . . . . F
Scatter, [illegible]illiam R. Hartill, 7513 Sausalito Avenue, Canoga Park 91307
[illegible]. Calif. Antique Mod. Plane Soc., A. Gallas, 8362 Castillian, Huntington Bch 92646 . . . . . M
Hot Leads, James R. Dean, 2216 S. Ross [illegible]reet, Santa Ana 92707
S. Calif. Ignition Flyers, R.G. Brickner, 4239 Centinela Ave., Los Angeles 90066 . . . . . F
Flightplug, R.G. Brickner (see above) . . . . . 12, P [illegible]
South Sacramento RC Flyers, Brian Gregory, 8706 Elkway, Sacramento 95624 . . . . . R
Stockton Gas Model Assn., Dick Myers, 218 Vista Del Rio, Gridley 95948 . . . . . F
Tailspinners RC Flying Club, Duane K. Luypen, 13811 Shoemaker, #64, Norwalk 90650 . . . . . R
Thermal Thumbers, Robert L. Regan, Jr., 18145 Leatherwood Way, Irvine 92664 . . . . . M
Thermal Thumbers Bulletin, Bob Regan (see above)
Thunderbugs, Joe L. Norcross, 4836 West 123rd Street, Hawthorne 90250 . . . . . F
Bug Buzz, Jim Scarborough, Box 393, Lawndale [illegible] . . . . . 12, P, X
Torrey Pines Gulls RC Soaring Soc., Larry Fogel, 1591 Calle Da Cinco, San Diego 92037 . . . . R
Journal, Lawrence J. Fogel, (see above)
Tracy Skyliners, Richard Andersen, 417 E. Benjamin Holt Dr., Stockton 95207 . . . . . M
Tri Valley [illegible] Modelers, John C. Lesuer, 2169 Lake Marie Dr., Santa Maria 93454 . . . . . R
Ukiah Prop Busters, David Lovitt, 479 Nokomis Drive, Ukiah 95482 . . . . . M
Vaca Valley RC'ers, Rick Keefer, 1060 East Tabor Avenue, Fairfield 94533 . . . . . M
Valencia Valley Headwinds, Edward A. Geisen, 22168 Barbacoa Drive, Saugus 91350 . . . . . R
Valley Vultures, Peter Hammond, 6005 Saratoga, China Lake 93555 . . . . . M
Valley Vulture Vibes, Wayne E. Stowe, 236 South Sunland, Ridgecrest 93555 6
Ventura County Comets, John Stewart, 10325 Darling Dr., Ventura 93003 . . . . . R
Visalia RC Thunderbirds, Manual Rico, 1221 Westcott Ave., Visalia 93277 . . . . . R
Willing Able Modelers, Gary Button, 7134 Blake Street, El Cerrito 94530 . . . . . M
Wing Busters RC Club, Chuck Hagan, 1155 Via Alta, Santa Maria 93454 . . . . . R
Woodland [illegible] Club, Robert Knowles, 255 Berryessa Drive, Vacaville 95688 . . . . . R
900 Club, William McConachie, 4111 Amaranda, Palo Alto 94306 . . . . . F
[illegible] Newsletters
AMSJ Fishwrapper, Andy Osborn, 748 North Genevieve Lane, San Jose 95128
Hangar Talk, Joe Ochoa, 2329 West St. Anne Place, Santa Ana 92704
Headwind, Lodi Model Assn., Arlie Preszler, 1111 S. Crescent Avenue, Lodi 95240
Pacific Breeze, Dick Satterlee, 2049 Vista Cajon, Newport Beach 92660 . . . . . 12, X
Patty's Pinkie, Patricia J. Sak, 2174 Westinghouse, San Diego 92111
S. Calif. CL Assn. Newsletter, Ben Sasnett, 584 Montview Dr., Escondido 92025
SULA News, Nancy Norwood, 2215 Clark Lane, Apt. C, Redondo Beach 90278 . . . . . 12, X

COLORADO

Aspen Valley RC Club, Thomas A. Moore, Box 707, Aspen 81611 . . . . . R
Boulder Aeromodeling Society, Don Ingrim, 6299 Delaney Rd., Louisville 80027 . . . . . M
Colorado Air Tragedy Society, Gerald O. Deneau, 2248 South Dayton, Denver 80231 C
Probable Cause, Jerry Deneau, (see above)
Grand Junction Modelers, Warren Hoaglund, 2803 Mesa, Grand Junction 81501 . . . . . M
Gunnison Gas Hogs, Dick Clothier, 221 North Main Street, Gunnison 81230 . . . . . M
Hot Springs Aeromodelers, Ken Shetler, 2412 Grand Avenue, Glenwood Springs 81601 . . . . . M
Jefco Aeromodelers, Sharon Patrick, 1878 South Teller, Lakewood [illegible] . . . . . R
Jefco Flyer, Steve Mangels, 1667 South Stuart Street, D[illegible] 80219 . . . . . 12, X
Magnificent Mountain Men, George Batiuk Jr., 1306 S. Parker Rd., #177, Denver 80231 . . . M
Mile-Hi [illegible]C Club, Albert Burman, 285 Pontiac Street, Denver 80220 . . . . . R
Mile-Hi Tailspinner, Harlan C. Palmer, 10882 Mildred Drive, Denver 80233 . . . . . 12, X
Montrose Mini Flyers, Steve Hosner, P.O. Box 1174, Montrose 81401 . . . . . R
Model Air-O-Nut-ics Club, Harold Gross, 10 Davis St., Monte Vista 81144 . . . . . M
[illegible] Museum Flying Club, Rolf D. Norstog, 11285 W. Kentucky Dr., Lakewood 80226 . . . . . F
Pikes Peak RC, John E. Cole, 2007 Warwick Lane, Colorado Springs 80909 . . . . . R
PPRC Newsletter, John A. de Vries, 4810 Moffat Lane, Colorado Springs 80915 . . . . . 12, X
Sky Corral RC Club, Dewey Osborn, 3717 Devonshire Lane, Pueblo 81005 . . . . . M
Snoopy's Squadron, Bob Weimer, 420 Euclid St., Ft. Morgan 80701 . . . . . M

CONNECTICUT

Bristol Hornets MAC, Phil Frechette, 183 Sonstrom Road, Bristol 06010 . . . . . M
Hornet's Nest, Chuck Tice, 23 Manor Road, Plantsville 06479 X
Central Conn. [illegible] Club, Charles [illegible]. Newman, 78 Muir Terr., Southington 06489 . . . . . R
Chaplin Airplane Modelers Soc., A. Lemieux, RFD 2 Back Rd., Willimantic 06226 . . . . . M
Conn. Valley RC Club, Richard M. Sartori, 15 Harrison St., Windsor Locks 06096 . . . . . R
Country Squire Modelers, Keith Bergquist, 45 Lakeside Dr., Fairfield 06430 . . . . . R
[illegible] Coast Swamp Flyers Club, Kenneth Hickey, 148 Farren Ave., New Haven 06513 . . . . . R
Fairfield League of Yankee RC'ers, John Cox, PO Box 490, Danbury 06810 . . . . . M
Flying Aces Club, David A. Stott, 86 Bankside St., Bridgeport 06479 . . . . . S
Glastonbury Aero Modelers, Edward Novak, 150 Price Street, Bridgeport 06610 . . . . . F
Glastonbury Modelers News, Allen Vollmer, 55 Masarik Avenue, Stratford 06497 6
Land-Air & Sea RC Assn., Frank Castiglione, 308 Meeting House Lane, Orange 06477 . . . . . R
Middlesex Aero Modellers, [illegible]. Barlow, [illegible] 4, Box 14 Fairlawn Ave., E. Hampton 06424 . . . . . R
Northeastern Drone Soc., Kent Williams, Apt. 3 South Rd., Bolton 06040 . . . . . R
Northern Conn. RC Club, Peter Haurkuk, 140 Chestnut Circle, W. Suffield 06093 . . . . . R
Northern Conn. RC Club News, Bernice H. Williams, 347 Southwick Road, Westfield, Mass.
Nutmeg RC Flyers, John V. Rossi, [illegible] Longmeadow Dr. Ext., Wolcott 06716 . . . . . M
NW Conn. RC Club, Thomas [illegible]. Francis, Cathole Rd., [illegible] #1, Litchfield 06759 . . . . . R
RC Club of Conn., Frank Baron, 84 Cobblers Hill Road, Fairfield 06430 . . . . . R
RC Prop Busters, James W. Parker, 17 West Main Street, Niantic 06357 . . . . . R
RC Prop Busters Newsletter, James [illegible]. Parker (see above)
Road Runners RC Club of Conn., Ray Money, 15 Fairview St., Ansonia 06401 . . . . . R
Shoreline Miniature Aircraft Assn., John Nilsson, 24 Homestead Pl., Brandford [illegible] . . . . . M

Simsbury MAC, Terri Knoblauch, 121 Hoskins Road, Simsbury 06070 . . . . . M
Simsbury RC Club, H.S. Wainewski, P.O. Box 431, Simsbury 06070 . . . . . R
Soc. of Antique Modelers, Ch. 7, John Whittles, 43 Fenview Ave., Old Saybrook 06475 . . . . M
SAM-7 Yankee Flyer, Carmen Botticello, [redacted] Bluefield Dr., East Hartford 06118 6
Southern Conn. Aero Mod. Assn., John Patchler, 193 Vineyard Rd., Hamden 06517 . . . . . M
Torrington—Winsted Aero, Thomas Rogenski, 280 Lyman Dr., Torrington [redacted] . . . . . R
Trumbull RC Club, Howard Linley, 2068 Huntington Tpke., Trumbull 06611 . . . . . R
Valley RC Club, Frank Alicandro, 1 Skoknrat St., Seymour 06483 . . . . . R
Wallingford RC Assn., Walter Damuck Jr., 225 S. Whittlesey Ave., Wallingford 06492 . . . . R
Flash Bulletin!, Walter E. Damuck, Jr. (see above)
Wintonbury Flyers Club, Ron Payne, 48 Holmes Drive, Windsor 06095 . . . . . M
Yankee Flyers of Conn., Joseph Burdick, 55 Mill Street, Putnam 06260 . . . . . R

DELAWARE

Delaware RC Club, John A. Scott, 1408 Carson Road, Wilmington 19803 . . . . . R
Static, George A. Moyer, Jr., 11 Orchard Lane, Wilmington 52283 12
Dover Mosquitos, Paul Kelley, Mifflin [redacted]ad, Dover 19901 . . . . . R
Mosquito Bite, Alvin W. French, 210 Charles Street, Milford 19963
First State RC Club, Gustave A. Shindel, 2432 Granby Road, Wilmington 19810 . . . . . R
Flying Blue Hens, Gustave Shindel, 2432 Granby Road, Wilmington 19810 . . . . . R
Flying Blue Hens Newsletter, George Heak, 10-D Florence Circle, Newark 19711
Mid Atlantic Radio Kontrol Soc., Rocky Kellman, 312 [redacted] Willey, Seaford 19973 . . . . . R

DISTRICT OF COLUMBIA

See Maryland and Virginia listings.

FLORIDA

Aeronuts, Phillip Brown, 850 NW 87 Avenue, Apt. 304, Miami 33126 . . . . . M
Aeromodelers of Orlando, Jim Bradley, 4847 Headlee Drive, Orlando 32807 . . . . . M
Aero Modelers of Perrine, Wm. J. Phinney, 14771 SW 298 Terr., Leisure City 33030 . . . . . R
Brandon Model Flyers, Richard [redacted] Werner, 518 Terrace Dr., Brandon 33511 . . . . . R
Broward Co. RC Assn., [redacted].T. Nicolle, 4710 N.W. 13th court, Lauderhill 33313 . . . . . R
Cape Coral Dust Busters, Therese J. Haufe, 5130 Glade Court, Cape Coral 33904 . . . . . M
Daytona Beacll CL Club, John Krutz, 76 Kenilworth Ave., Ormond Beach 32019 C
Daytona Beacll RC Assn., David G. Mayor, 611 E. 16th Avenue, New Smyrna Beach [redacted] . . R
Elgin Aero Modelers, Ronald E. Van Putte, 12 Connie Dr., Shalimar 32579 . . . . . M
BEAM, Ronald E. Van Putte, (see above) . . . . . 12, P, X
Fingercrackers, Gerald M. Ross, 1700 Pontiac Circle South, Melbourne 32935 . . . . . M
Fingercrackers Messenger, Richard Sylvester, 765 Ironwood Drive, Melbourne 32935
Florida Free Flight Team, Francis Carney, 1839 Loyola Dr., Jacksonville 32218 . . . . . F
Florida Scalemasters, James Scroggins Jr., 6245 Flager Street, Hollywood 33023 . . . . . S
Flying Gators MAC, Robert P. Ricci, 3515 NW 50th Avenue, Gainesville 32605 . . . . . M
Gateway RC Club, Barbara Tuttle, 5206 Trout River Blvd, Jacksonville 32208 . . . . . R
Gold Coast RC'ers, Arthur Lewis, 498 N.E. 37th St., Boca Raton 33432 . . . . . R
Gulf Hawks MAC, Duane R. Osborn Jr., 6525 6th Ave. N., St. Petersburg 33710 . . . . . M
Imperial RC Club, Eugene Hayden, 104 5th [redacted]. Jan Phyl Vlg, Winter Haven 33880 . . . . . R
Indian River Kontrol Soc., D.P. Tiffany, 545 Bahama Dr., Indialantic 32903 . . . . . R
Manasota RC Assn., Donald Janssen, Rt. 1 Box 1033, Venice 33595 . . . . . R
Miami Indoor Aircraft Model Assn., J. Martin Jr., 3227 Darwin St., Miami 33133 I
Miracle Strip Modelers, Rodney Neudecker, 1123 Lindenwood Dr., Panama City 32401 . . . . M
Moonport Modelers, Jim Foch, P.O. Box 1214, Titusville 32780 . . . . . M
Northwest Florida RC Modelers, Tom Batten, 2182 Atwood Dr., Pensacola 32504 . . . . . R
Orlando Buzzards RC Soaring Soc., Oscar Davidson, 1113 Naples Dr., Orlando 32804 . . . . . R
Palm Beach Aeronauts, Fred A. KomLosy, 725 Robin Way, North Palm Beach 33408 . . . . . R
Palm Beach Aeronauts News, Fred A. KomLosy, (see above)
Palm Beach Skyhawks, Ronald L. Day, 1409 North J Terrace, Lake Worth 33460 . . . . . M
Pensacola Aeromodelers, Rae W. Fritz, 1005 Revere Drive, Pensacola 32505 . . . . . R
Pensacola Free Flight Team, Tom McLaughlan, 4140 Fern Ct., Pensacola 32503 . . . . . F
RC Club of Jacksonville, Marlene Harcum, 8844 Briarwood Road, Jacksonville 32217 . . . . R
Seminole Modelers, Gary Weideman, 8870 79th Place N.E., Seminole 33542 C
Seminole Radio Control Club, Russell Spencer, 529 E. 7th Ave., Tallahassee 32303 . . . . . R
Southern Aerobatic Kontrol Soc., Anthony Marabilio, 2706 Tropical Ave., Vero Bch 32960 . . R
Suncoast Aeromodelers, Theodore J. Van Zyl, Sr., 3029 Pinetree Avenue, Largo 33540 . . . . R
[redacted] Florida Tailspinners, Ron Smith, 125 Lucille Ave., Ft. Myers 33905 . . . . . M
SW Fla. Tailspinners Newsletter, Ruth Bracious, 2818 Meadow Ave., Ft. Myers 33901 . . . 6, X
Tamps Area Model Pilots Assn., Eugene Roll, 717 Forrestville La., Tampa 33614 . . . . . R
Tampa Bay Modelers, Jean Rindge, 6010 Ambassador Drive, Tampa 33615 . . . . . M
Tampa RC Aircraft Club, Paul Wiese, 4115 Okara Road, Tampa 33617 . . . . . R
TRAC News, Russell Lepre, 4017 Corona Street, Tampa 33609 12
Tampa Sky Kings, James M. Dees, 16237 Lake Palm Drive, Lutz 33549 . . . . . R
Tropic Aeros RC Club, Homer Barton, 3108 Indiana St., Miami 33133 . . . . . R
Wing Overs, Nell Kruse, Rt. 15 Box 1082, North Ft. Myers 33903 . . . . . M
Other Newsletter
Florida Newsletter, Fla. Modelers Assn., James F. Bradley, 4847 Headlee Dr., Orlando 32807

GEORGIA

Albany Model Airplane Club, Harold Mahoney, 2211 Robinhood Rd., Albany 31707 . . . . . R
Athens Model Aircraft Club, James McCall, Jr., 60 Gail Drive, Athens 30601 . . . . . R
Atlanta RC Club, Gregory Jannakos, 1451 Grafton Ct., Stone Mountain 30083 . . . . . R
Atlanta Sky Raiders, E.M. Gillies, 4479 Orleans Court, Chamblee 30341 C
Atlanta Drone Society, W.N. Lifsey, 3237 Lynnray Drive, Doraville [redacted] . . . . . R
Balsa Aerodynes, David Diehl, 6120 Newick Drive, Columbus 31907 . . . . . R
Central Ga. RC Aircraft League, [redacted]. Schmidt, 159 Little John Ln., Warner Robins 31093 . . . . R
Coastal Empire RC Society, Van Swindells, 3618 Oakland Ct., Savannah 31404 . . . . . R
Cobb County Sky Rebels, Bob Stevenson, 291 Sourwood Drive, Marietta 30062 C
Sky Rebel Yell, Richard Schneider, 3346 Key Street NE, Marietta [redacted] . . . . . 12, P, X
Cobb County [redacted] Modelers, Edwin Seigler, 803 Chapman Drive, Marietta 30062 . . . . . R
Columbus-Ft. Benning RC Flyers, Chris Joiner, 5941 Warner Rd., Columbus 31904 . . . . . R
Columbus-Ft. Benning RC Flyers News, Chris L. Joiner, (see above) . . . . . 12, P, X
Conley Flyers, E.W. Sleight, 4185 Williamsburg Drive, College Park 30337 . . . . . R
[redacted] Flyers, Giles Bailey, II, 1709 Oak Drive, Augusta 30904 . . . . . M
Robins Model Flyers, C.J. Manspeaker, P.O. Box 546, Warner Robins 31093 . . . . . R
Savannah Prop Twisters, George Collins, 1518 Kings Way, Savannah 31406 C

HAWAII

Aloha RC Club, Lou Cislo, 46 323 Kahwhipa Street, Kaneohe 96744 . . . . . R
Hanalike RC Club, Gilbert Bugado, 458 Mohouli Street, Hilo 96720 . . . . . R
Hawaii Controline Club, Bertram Chikazawa, 95-605 Vailoa Loop, Mililani 96789 C
Hawaii Jet Rangers, Kevin Lui, 4130 Kahala Avenue, Honolulu 96816 . . . . . R
Hawaii RC Club, Milton Sher, 5125 Poola Street, Honolulu 96821 . . . . . R
Hawaiian Flypaper, Ben E. King, 4138-1 Keanu Street, Honolulu 96816 . . . . . 11, X
Kapiolani RC Club, Leonard T. Onaga, [redacted] 280 Aiea Kai Pl., Aiea 96701 . . . . . R
Kona RC Flyers, [redacted] Miranda, P.O. Box 1354, Kailua Kona 96740 . . . . . M
Valley Isle Model Pilot Acad., Gordon Carvalho, P.O. Box 42, Wailuku Maui 96793 . . . . . M

IDAHO

Boise Area RC Soc., Jerome [redacted]. Thompson, 4205 Edwards, Boise 83703 . . . . . R
Coeur d'Alene Aeromodeling Soc., Clarence Haught, Rt. 2, Box 10, Coeur d'Alene 83814 . . . M
Lewis Clark RC Model Club, Duane R. Greene, 1927 Idaho Street, Lewiston 83501 . . . . . M
Magic Valley Aeromodelers, Gene Adsmond, Rt. 1, Kimberly 83341 . . . . . M
Pocatello Glue Angels, Lucia K. Diegel, P.O. Box 2307, Pocatello 83201 . . . . . M
Balsa Sheet, Al Culver, 231 Fairbanks, Pocatello 83201

ILLINOIS

Aero Angels, Mark Bauer, 4944 North Orange, Norridge 60656 C
Aero-Bats Model Airplane Club, Charles Puckett, 213 Grant Street, Mt. Vernon 62864 . . . . M
Aero Sport RC Club, John M. Mayer, 613 Fairview, Mt. Prospect 60056 . . . . . R
Aero Telemechanics RC Club, John I. Burns Jr., 827 [redacted]. East Ave., Oak Park 60304 . . . . R
Belleville RC Flyers, Gene Bail, 208 N. 48th Street, Belleville 62223 . . . . . R
[redacted] Max Flying Club, Frank S. Stillson, 214 W. Norman Lane, Wheeling 60090 . . . . . R
Champaign Country [redacted] Club, Ken Kurz, 103 Paddock Drive East, 84, Savoy 61874 . . . . . R
Champaign-Urbana Aeronauts, John W. Laws, Box 191, Hindsboro 61930 C
Checkerboard Field RC Club, Robert G. Petrinec, 617 South East Avenue, Oak Park 60304 . . . R
Chicago Aeronuts, Edward F. Fort, 660 Sunset Drive, Naperville 60540 C
Chicagoland RC Modelers, Richard D. Madl, 461 Vassar Ln., Des Plaines 60016 . . . . . R
Chicago Pylon Club, [redacted] Vojslavek, 7819 Chestnut Avenue, Woodridge 60515 . . . . . R
Chicago Scalemasters, William P. Naylor, P.O. Box 50129, Cicero 60650 . . . . . S
Chicago Scalemasters Newsletter, Keith Ward, 638 Swain Street, Elmhurst 60126
Cicero Prop Nuts, James K. Roberts, 2213 [redacted]. Laramie Avenue, Cicero 60650 . . . . . M
Columbia RC Club, Richard Jamerson, [redacted] Helen Court, Cahokia 62206 . . . . . R
Crete Thermal Hunters, Sailplane Club, Werner Lousch, 1779 Sangamon, Crete 60417 . . . . . R
Decatur Aero Commanders RC Club, Howard Dunham, 3323 W. Marshall, Decatur 62522 . . . . R
Decatur Blunder Birds, Bruce R. Buffie, 1852 Baltimore, Decatur 62521 . . . . . R
De Kalb Cloud Dusters, Dutch Hess, 137-1/2 E. Lincoln, De Kalb 60115 . . . . . M
East Side RC Club, Robert Hintz, 19 Georgetown Drive, Granite City 62040 . . . . . R
Elgin Academy [redacted] RC Fliers, William Teeters, 814 Pollitt Dr., Elgin 60120 . . . . . R
Flying Fools MAC, William E. Griffith, 846 E. Main Street, Bushnell 61422 . . . . . M
Flying Fools/St. Charles, Margaret Madsen, 5848 S. Brainerd Ave., Lagrange 60525 . . . . . M
Freeport Model Air Club, James Hainke, 815 W. Hamilton Street, Freeport 61032 . . . . . M
FREEMAC, Ralph F. Beckmeier, [redacted] S. Freeport 61032 . . . . . 12, X
Fox Valley Falcons, G[redacted] Durham, 30 W. 085 Bruce Lane, Naperville 60540 . . . . . M
Fox Valley RC [redacted] Robert Stricker, [redacted]. #1, 7 Hawthorne Dr., Oswego 60543 . . . . R
Illinois [redacted] Aero Club, David Miller, 18017 Wildwood, Lansing 60438 . . . . . M
Illinois Valley Radio Control, Dale Bees, Box 167, Serena 60549 . . . . . R
Chord and Span, [redacted] Gill, Route 4, Streator 61364
Intrapid [redacted] Men, C[redacted] P. Audo, 108 South 6th St., St. Joseph 61873 . . . . . M
Joliet RC Club, [redacted]d J. Vidano, 1115 Waverly Place, Joliet 60435 . . . . . M
Kankakee Val. Mod. Flyers, A. Zoph, Burchs Mob. Home Pk. Lot V10, Bourbonnais 60914 . . . R
Kishwaukee RC Flyers, Ronald R. Sassman, 931 16th Street, Rochelle 61068 . . . . . R
Lake Shore RC Club, [redacted] Trapp, [redacted] S. Arlington Hgts, Arlington Hgts 60005 . . . . R
Lily Lake Air Knockers, Marlene Morrison, 5 N. 307 Hansen Rd., St Charles 60174 . . . . . M
Lincoln Trail RC Flying Club, Albert I. Minnick, R.R. 4, Robinson 62454 . . . . . R
Morrison Model Aircraft Flyers, C.S. Scarbrough, 207 S. Base St., Morrison 61270 . . . . . M
NAL Barnstormers, Mark Kibilko, 160 May Street, West Chicago 60185 . . . . . R
Naperville [redacted] Club, Paul Jacobs, 839 North Brainard, Naperville 60185 . . . . . R
North County Flyers, Robert W. Holstein, 803 South Main, Red Bud 62278 . . . . . M
Northwest RC Club, Malcolm A. Sime, 143 N. Westgate Road, Des Plaines 60016 . . . . . R
Okaw Valley RC Club, Donald L. Seals, 201 Grandview Street, Paris 61994 . . . . . R
Palos [redacted] [redacted] Club, Martin L. Tew, 3330 W. 100th Street, Evergreen Park 60652 . . . . R
Crash Chronicle, Don Sobba, 9641 Avers Avenue, Evergreen Park 60642 . . . . . 12, X
Pegasus RC Society, Howard [redacted]. Kubsch, 116 Thornhurst Rd., Bolingbrook 60439 . . . . M
Pekin RC Club, Norman C. Harvey, 207 Third Street, South Pekin 61564 . . . . . R
Pekin RC News, Hemon D. Lowery, 2423 Tazewell Road, Pekin, 61554 . . . . . 12, X
Peoria RC Modelers, Bob Suhr, 1913 Echo Court, Bartonville 61607 . . . . . R
Pontiac [redacted] Flyers, Floyd [redacted]. Fitzgerald, 626 W. Lincoln Ave., Pontiac 61764 . . . . . M

Prop ■ Wing, Richard Ehnert, 2030 Walnut Street, Waukegan 60085 C
Quincy Flying Falcons, Lloyd T. Boden Jr., 705 Monroe Street, Quincy 62301 . . . . . R
Radio Control Sport Fliers, Jack G. Runnels, P.O. Box 67, Humboldt 61931 . . . . . R
Rantoul Prop Busters, c/o Slot & Wing Hobbies, 511 S. Century, Rantoul 61866 . . . . . R
RC Club of Chicago, Wm. A. Hargreaves, 14703 Lincoln Ave., Dolton 60419 . . . . . R
RC 3 Sheet, ■■ Hargreaves, (see above) . . . . . 26, P, X
Red Barons, Robert Taff, 111 Durham Court, Hoffman Estates 60172 C
Rockford Aeromodelers, Art Johnson, 1818 Oslo Drive, Rockford 61108 . . . . . R
Rock Valley RC Flyers, ■■■ Hyland, 912 Kingsway Ave., Rockford 61108 . . . . . R
Rock Valley RC Flyer, ■■ Fowler, 1774 Greenleaf Way, Rockford 61108 . . . . . 12, X
Sandwich Tree Toppers, David Ikonen, 347 W. Second St., Sandwich 60548 . . . . . M
Sentral Illinois ■adio Society, Thomas G. Hanson, 218 Doud Dr., Normal 61761 . . . . . R
SIRS Newsletter, Joseph ■. Cae, RR 1, Towanda 61776
Sky Knights Aeromodeling Team, S. Smith, 311 E. Tower Dr., Barrington 60010 . . . . . R
Skylarks, Edwin Beyer, 281 North Middleton, Palatine 60067 . . . . . R
Sky Squires, Jacob O. Bach, 10 Hillcrest ■rive, Carbondale 62901 . . . . . R
SOAR, Oliver C. Wilson, 810 Rose Court, Lisle 60532 . . . . . ■
Springfield Sunday Flyers, Ron Greene, 2234 E. Ash, Springfield 62703 . . . . . ■
Suburban Aero Club of Chicago, Charles Bedwell, 228 Mayfair Pl., Chicago Hts 60411 . . . . . R
Dope Can, Randy Shenk, 463 South Third Street, Peotone 60468 . . . . . 12, X
Thorn Creek RC Club, Robert Lisiecki, 14327 Calhoun Ave., Burnham 60633 . . . . . R
Treetown Modelaires, Richard Striker, 800 Penrith, Elk Grove Village 60007 . . . . . R
Tri-Village RC'ers, Jim Cywinski, 725 Russet Lane, Streamwood 60103 . . . . . R
Vermillion County RC Club, John Nicklas Jr., R.R. #1, Box 100, Fairmount 61891 . . . . . R
West Surburban RC'ers, Joe Antunes, 303 E. Myrick Avenue, Addison 60101 . . . . . ■
Woodland Aero Modelers, George Bucic, 7805 Knottingham Lane, Downers Grove 60515 . . ■
Other Newsletter
Fox Valley ■■d. Airp. Assn. Newsletter, Arthur Johnson, 1818 Oslo Dr., Rockford 61108

INDIANA

Central Indiana Aeromodelers, Guido Speedy, 4940 Fletcher St., Anderson 46014 . . . . . F
Columbus Model Club, Russell Kuhn, 525 Cleveland Street, Columbus 47201 . . . . . ■
Converse RC Flying Club, Charles Vermillion, 2157 W. ■■ St., Marion ■■■■ . . . . . R
Dekalb Flying Models Club, Richard Barber, 711 Tecumseh Court, Auburn 46706 . . . . . R
Eastern Indiana RC Assn., David Marquis, ■■ 3, Richmond 47374 . . . . . ■
Wireless, David Doggy, 87 S. 24th Street, Richmond 47374
Elkhart County Flight Masters, Ken Loucks, 2312 Beshor Road, Goshen 46526 . . . . . ■
Evansville RC MAC, Carl R. Jarvis, 1828 E. Blackford, Evansville 47714 . . . . . R
Ft. Wayne Flying Circuits, Win Davis, 7108 Chartercrest Drive, Ft. Wayne ■■■■ . . . . . R
FWFC Newsletter, John D. Matthias, 5034 Madiera Dr., Apt. C, Ft. Wayne 46805
Griffith Barnstormers, Andrianna Wright, 231 North Jay, Griffith 46319 . . . . . M
Hamilton ■■ Modelers, Benjamin J. Marcel, 1321 King's Cove Court, Indianapolis 46280 . . . ■
Huntington Co. Modelers, Thurman E. Pox, 814 ■. Jefferson St., Huntington 46750 . . . . . M
Indianapolis RC Modelers, Louis Schmalz, 8624 E. Rawles Ave., Indianapolis 46219 . . . . . R
Indianapolis RC South, Charles E. Leverenz, 6207 Derbyshire Road, Indianapolis 46227 . . . . . R
Split S, Charles E. Leverenz, (see above) . . . . . 12, X
Indianapolis W. Side RC Modelers, Jack Blacker, RR 2, Box 68A, Brownsburg 46112 . . . . . R
Indy Sportliners Club, Paul Hoffman, 8637 Skyway Drive, Indianapolis 46219 C
Kokomo Blue Angels, Richard Weeks, 5709 Peshewa Court, Kokomo 46901 . . . . . R
Knightstown RC Club, Richard Waits, 104 S. Madison St., Knightstown 46148 . . . . . M
Lafayette Cloud Jockeys, Ralph Ramsey, 223 Main Street, Lafayette 47901 . . . . . M
Lapel Flying Modelers, Ralph R. Wellons, 829 Hattie Drive, Anderson 46013 . . . . . R
Lebanon Aeronuts, Robert A. Bluebaugh, 603 Stoltz Street, Lebanon 46052 . . . . . R
Logansport Thunderbirds, Eugene Hanewalt, 3124 Fairview Ave., Logansport 46947 . . . . . R
Madison County ■■ Flyers, Jerry Payton, 601 W. Washington St., Alexandria 46001 . . . . . ■
Marion ■■■■ Menders, Jim Whirl, 1020 West 4th, Marion 46952 . . . . . M
Monroe County RC Club, Dennis Friesel, RR ■ Shields Ridge Rd., Bloomington 47401 . . . . . ■
Muncie Controliners, Robert Abernathy, RR 2, Box 648, Yorktown 47396 C
Munsee Skychiefs ■■ Club, Gary Bussell, 4900 Connie Drive, Muncie 47304 . . . . . ■
North Liberty RC Club, Patricia Oakes, ■■■ Williams Street, ■. Liberty 46554 . . . . . R
Pelican MAC, Harvey Terpstra, 17750 Clyde Avenue, Lansing 60438 . . . . . F
Screaming Eagles RC Club, Jack Blacker, RR 2, Box 68A, Brownsburg 46112 . . . . . R
Sky Knights, Robert Unsicker, ■■ 1, Bremen 46506 . . . . . ■
Skyliners, ■■■ Koerner, 722 Parallel Avenue, Sellersburg 47172 C
Southern Indiana RC Modelers, R.G. Fowler, 308 Longview Dr., Jeffersonville 47130 . . . . . R
Terre Haute RC Club, John F. Adkerson, ■■ 21, Box 756, Terre Haute 47802 . . . . . R
Tri County Aero Club, Pat English, 823 Broadway, Vincennes 47591 . . . . . M
Tri Valley RC Club, Robert J. Stewart, 1142 E. Altgold Street, South Bend 46614 . . . . . R
Wabash Valley RC Club, Carl McCain, 15 South Water Street, Peru 46970 . . . . . R
Warsaw Aero Modelers, Allen Hartman, 1315 E. Ft. Wayne Street, Warsaw 46580 . . . . . M
Whitewater Valley RC Club, David A. Marquis, ■■ 3, Richmond 47374 . . . . . R

IOWA

Balsa Busters, D.K. Hutcheson, 317 Spencer Ave., Council Bluffs 51501 C
Black Hawk RC Pilots, Jim Porter Jr., 1939 College, Cedar Falls 50613 . . . . . R
Stick Times, Robert A. Camarata, 2537 Saratoga Drive, Waterloo 50702 . . . . . 12, P, X
Burlington MAC, Robert Mueller, 915 South Tenth Street, Burlington 52601 . . . . . M
Castor Oilers, Joseph E. Nave, 3506 Somerset Drive, Bettendorf 52722 C
Cedar Rapid Skyhawks, D.M. Lewis, 2215 12th Avenue, Marion 52302 . . . . . M
Central Iowa Aeromodelers, Fred ■■■r, 2417 47th Street, ■■ Moines 50310 . . . . . M
CIA Report, Dean Swift, 7403 Wilden Drive, ■■ Moines 50322
Cobra RC Club, Lynn W. Fehr, 454 Mt. Vernon Drive, Council Bluffs 51501 . . . . . R
Stinger, Larry D. Puls, 1020 ■■■ Street, Council Bluffs 51501
Davenport MAC, Gary Holt, 2167 Telegraph Road, Davenport 52804 C
Des Moines Modelaires RC Club, Harold Lee, 4128 East 29th, Des Moines 50317 . . . . . R
■■■■■ *News*, Gwen/K.K. McClure, 5703 Terrace Drive, Des Moines 50312 . . . . . 12, X
Dodger RC Club, E.M. Milenberg, 1278 7th Ave. North, Ft. Dodge 50501 . . . . . R
Iowa City Aero Hawks, Charles Beaumont, 126 Post Rd., Iowa City 52240 . . . . . ■
Aero Hawks Newsletter, John Seabs, 45 North Dubuque Street, North Liberty 52317
Iowa City RC Club, J.R. Warner, 810 So. Dubuque Street, Iowa City 52240 . . . . . R
Mississippi Valley RC Club, Steve Wiedner, Park View Trailer Court, Waukon 52172 . . . . . M
Muscatine Miniature Aircraft Assn., J. Staschke, ■■ Box 634, Wilton Jct. 52778 . . . . . R
Muscatine RC Unlimited, William Gremmels, 2801 Highland Ct., Muscatine 52761 . . . . . ■
■■■■ Tri-County RC Modelers, Arnold Schmidt, 410 19th Ave., Charles City 50616 . . . . . ■
River City RC, Donald Fuller, 201 South Vermont, Mason City 50401 . . . . . R
RC-RC News, Donald A. Fuller, 201 South Vermont, Mason City 50401 . . . . . 12, P, X
Sioux City Falcons, Stan E. Failer, 2204 Summit Street, Sioux City 51104 . . . . . R
Tri County RC Modelers, ■■■nd Wilt, 1118 Forest Street, Carroll 51401 . . . . . R
Tri State Modelers, Harold Styer, 2845 Northridge Drive, Dubuque 52001 . . . . . ■

It seems a little hard to believe that only a few years ago the entire listing of ■■■■ Chartered Clubs could be printed in just one issue. But the amazing rate of growth of these clubs throughout the country ■■■■ took up two months ■ available space, and last year the whole list couldn't ■■ accommodated in less than three months; that's our target again this year.

Official Sanctioned Contests of the Academy of Model Aeronautics

Note: For quick response and ■■ a favor to those staging, administering and directing the contest, be certain to send a stamped, self-addressed, envelope along with your request to the listed Contest Director (CD) for additional information.

Jan. 31-Feb. 2—Akron, Ohio (AA) 10th Annual Chapel Hill Show for Indoor Static Display-Judging-Outdoor Demonstrations. Site: Akron. J. Yarger CD, 1100 Browning Ave., N., Canton, Ohio 44720.

Feb. 2—Green Bay, Wisc. (A) Annual Polar Bear FF Contest. Site: Frozen Bay R. Cowles, Jr. CD, 2424 Ducharme Ln., Green Bay, Wisc. 54301.

Feb. 2—Jamestown, N.Y. Flying Aces Winter Fly-for-Fun Meet. Site: Club Fi■■. W. Johnson CD, ■■ Widng Ave., Jamestown, N.Y. 14701.

Feb. 2—Ft. Lewis, Wash. (A) "Misery" Meet 15th Annual FF (Cat. III) Meet. Site: Harts Lake Prairie. D. Zipoy CD, 264 - 1■■■ NE, Bellevue, Wash. 98008.

Feb. 9—Glastonbury, Conn. (AA) Winter Wings Indoor (Cat. I) Meet. Site: Glastonbury High School. ■. Armstead CD, 89 Harvest Ln., Glastonbury, Conn. 06033.

Feb. 15-16—Bakersfield, Calif. (AA) North-South RC Challenge Meet. Site: Famoso T. Christian CD, 893 Blazingwood Ave., San Jose, Calif. 95129.

Feb. 16—Ft. Lauderdale, Fla. (A) Gold Coast Scale/Combat RC Jamboree. Site: Markham Park. A. Johnson CD, 932 Banyan Dr., Delray Beach, Fla. 33444. Sponsor: Gold Coast Radio Controllers.

Feb. 16—Aurora, Colo. (A) ■■■■ Monthly Indoor Meet. Site: Hinkley H.S. ■. McGhee CD, 1260 Elm, Denver, Colo. 80220. Sponsor: Magnificent Mountain Men.

Feb. 16—Plymouth, Mich. (A) ■■■ Annual Sno-Fli RC Meet. Site: Plymouth. A. Slagle CD, 26314 Kilarton, Farmington, Mich. 48024.

Feb. 16—Ops Locks, Fla. (A) ■■■■ Park ■ Rec. Indoor (Cat. II) Meet. Site: Goodyear Blimp Hangar. G. Myers CD, 13918 SW 90th Ave., Miami, Fla. 33157.

March 7-9—Mentor, Ohio Plane ■ Space Model Show. ■■■ Great Lake Mall. ■. Mangan CD, 30224 Powell Rd., Willowick, Ohio 44094.

March 9—Anderson, Ind. (AA) C.I.A. 2nd Annual Indoor (Cat. II) Meet. Site: Anderson Sr. High School Gym. P. Sullivan CD, 3021 Spring Valley Ct., Anderson, Ind. 46011.

March 16—Denver, Colo. (A) Spring is Here Indoor Meet. Site: Hinkley H.S. J. Murphy CD, 2432 Astron Dr., Colorado Springs, Colo. 80906.

March 16—Ops Locks, Fla. (A) MIAMI Park ■ Rec. Indoor (Cat. II) Contest #6. Site: Goodyear Blimp Hangar. G. Myers CD, 13918 SW 90th Ave., Miami, Fla. 33157.

March 29—Locust Valley L.I., N.Y. LIAMAC Indoor (Cat. I) Record Trials. Site: Friends Academy. J. Pallet CD, 30 Emerson Rd., Brookville, N.Y. 11545.

April 13—Dayton, Ohio (A) Buzzin' Buzzards Combat Ct. Bash. Site: Municipal Flying Field. R. Perry CD, 5018 Angelita Ave., Dayton, Ohio 45424.

April 15—Glastonbury, Conn. (AA) Spring Indoor (Cat. I) Fling. Site: Glastonbury High School. G. Armstead, Jr. CD, 89 Harvest Ln., Glastonbury, Conn. 06033.

April 19-20—Riverdale, Md. 2nd Annual Pro-Am Invitational Meet. Site: Riverdale ACF Plant. W. Nesbitt, Jr., CD, 1115 Chickasaw Dr., Silver Spring, ■■. 20903.

April 20—Ops Locks, Fla. (A) MIAMI Park ■ Rec. Indoor (Cat. II) Contest #7. Site: Goodyear Blimp Base. ■. Myers CD, 13918 SW ■■■ Ave., Miami, Fla. 33157.

April 26-27—Raleigh, N.C. (AA) 3rd Annual Spring RC Meet. Site: Raleigh Flying Site. W. Franklin CD, Rt. 6, Box 189, Durham, N.C. 27703.

April 26-27—Dallas, Tex. (AAA) Dallas Rounders Spring CL Roundup. Site: Hobbypark. J. Bussell CD, 4803 Fallon Pl., Dallas, Tex. 75227.

PFALZ

(Continued from page 92)

CG in the suggested location. Now, throw a few more weights in the model box just in case it's windy. Next, switch on the radio and make doubly sure that the controls are hooked up correctly. Somebody's law says that if it's possible to assemble it wrong, it will be done wrong one day, so *check*. I know this from personal experience, as I once spent a day flying with the transmitter backwards due to a reversed rudder.

Check to see if the wings are warped, and correct if necessary. When all these procedures have been completed, it's off to the flying field, and into the air.

And this is where I'll leave you—good flying, and soft landings.

G.S.R.C.

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eliminating most of the noise that might have built up through the various stages of amplification.

In summary then, the ability of a receiver to resist noise is a function of the number of stages and levels of tuning provided. The more stages, the sharper the tuning and the better the noise rejection. Some technical terms used to indicate this quality are, "image rejection," "adjacent channel rejection," and "spurious noise rejection." They are usually expressed in decibels (DB) below signal at some frequency displacement from the carrier frequency. Normally, the more DB down the better, at a given displacement frequency.

Some other techniques used to improve sensitivity and selectivity are use of Field Effect Transistors (FETs) and automatic gain control (AGC). But this practice is fairly common and shouldn't

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STEPHENS AKRO

(Continued from page 44)

baking soda to prevent corrosion. If you built the balsa wing, check for warps and straighten while the rest of us move on to the tail surfaces.

Tail: Both vertical and horizontal surfaces are built up and paper-covered for lightness. The real Akro uses built-up tail surfaces, too, so you will still be "scale." Use light 1/2" sheet for the stab and light 3/8" for the fin and rudder. I believe, along with Rabe and the RC fliers, that thick tail surfaces make a

model much smoother. Be sure to add a small plywood mount for the rudder horn. Hinge the rudder and elevator as you did the flaps.

Fuselage: Begin the fuse by selecting matched, 4" wide sheets of quarter-grain 3/32" sheet. If there is a heavy end to the sheet, it should be at the nose. Next, carefully mark the sheets with the centerline positions of wing and stab, extending these lines forward and aft of the position where the surfaces will go. The reason for this procedure is to ensure alignment later. The top of the fuse is not straight and cannot be used as a reference. At the same time, mark the doublers with the motor mount positions. The thrustline is exactly at the wing root centerline. Draw centerlines on all formers to aid in alignment, and assemble the basic fuse, using epoxy at the front and aliphatic resin glue at the rear.

A word about the tank: I used a 4 oz. tank on the original. With a Du-Bro muffler and the engine set at a rich two-cycle, there is just enough fuel for the pattern on a Max 40. If you are going to usa a 46, build a 5 oz. tank by cutting off a 1" section of another tank and soldering it onto the rear of the first. Both the Don's and Veco tanks are 1 oz. to the inch in length, so it is easy to gauge your tank size. By all means, revent the tank with annealed copper tubing and your favorite vent setup. I prefer the uni-flo system, as outlined in many other stunt articles.

Landing Gear: The gear is a torsion bar-type, which can move both vertically and horizontally to absorb bounces. Do not omit the wire bracing inside the fairings, as the flexing of the gear will create cracks without them. Use solid rubber wheels, such as those made by Banner or Kraft. Hollow wheels tend to flatten when the model is sitting, then hang up in the pants on takeoff. The narrow, racing-type wheels just don't look right. Use the softest balsa you can find for the pants and hollow the center section as much as possible. Be sure to fuelproof inside with a coat of epoxy before assembling the laminations.

Final Assembly: Cut out the top of the fuse and insert the wing, lining up carefully, then epoxy. Cut and form the elevator pushrod and install it first in the elevator, then in the flaps. Now, install the stab assembly in the fuselage,

moving it slightly fore and aft as necessary to keep the flaps and elevators at neutral setting. Install the landing gear and tail wheel, and sheet the bottom of the fuse. Hollow the top block from the cockpit aft and join, using epoxy and cloth on the inside (see plans). Add this assembly, then glue the bottom block in place and sand to basic shape.

At this point, add the cowl formers and "seats" for the ply sheeting. The 1/64" ply is cut to shape with scissors. Attach to the top seat with five-min. epoxy, allow to dry, then wrap around and glue to the formers and bottom seat. It is really easier to do than to describe. Add the nose block and sand the whole fuse to shape as shown in the photos.

Finish: This is a bulky model, a light finish is important. Here is what I suggest: two coats of Sig Lite-Coat clear on all surfaces before covering with 00 silkspan or Jap tissue, followed by three coats of Lite-Coat clear and one coat of AeroGloss Balsa Filler, wet-sanded with 320 grit paper. Spray all color, using only enough to cover. Spray the trim and follow with three heavy coats of Lite-Coat on top of everything. Sand this with 600 paper and polish out with Brasso metal polish, followed with wax.

The original model was finished with two coats of Francis Resin, one coat of Superpoxy filler, and one coat of Superpoxy color. This also works fine, but requires a lot of sanding in the filler stages to remove weight.

FLYING

Begin with CG, rudder leadouts, and tip weight as shown on plans. Trim according to your own tastes. I prefer less tip weight and more rudder than most

people. You will find the Akro stable, smooth, and realistic. If yours is sluggish, don't hesitate to add power and prop size. I use ■ 12 x 6 Rev-Up trimmed to 11½. A 46 can use a full 12 x 6.

I have included references to articles on the full scale Akro if you want more data for scale details and color schemes. My thanks to Al Rabe for help in preparing this article, and to Becky for typing it and putting up with the hobby in general. Let me know how your Akro flies. My address is: Tom Dixon, 9025 Hurst Ct., Jonesboro, Ga. 30236.

REFERENCES:

The Stephens Akro story, Don Berliner and Bob Pauley, **AAM** August, 1973.

Stephens Akro, Budd Davisson, *Air Progress* October, 1973.

The Dude, Bill Turner, *Private Pilot*, November, 1973.

Info. Pack, Stephens's Aircraft, P.O. Box 3171, Rubidoux, Calif. 92509 ($2.00).

Stephens Akro, Brad Shephard, *Model Builder*, October, 1972.

TERRY'S TONI

(Continued from page 60)

The servo installation system is unique, in that the rails are attached to the cockpit floor structure as [redacted] ■ the fuselage sides. Spot-glue the cockpit structure in place and then seal it permanently to the fuselage with RTV. Epoxy the top of the servo rails (balsa and hardwood sandwich) to the bottom of the cockpit floor and RTV them to the sides of the fuselage. This system provides a strong, vibration-resistant structure, and ■ also will prevent any dust or spray paint from ruining your cockpit work.

At the tail end I got lazy. In place of the directionally controlled device I just used a fixed skid, wired to a small, hardwood block which [redacted] epoxied (with glass cloth) to the inside of the fuselage.

Wing: The foam cores for the wing are of excellent material and cut accurately with the proper wash-out. Terry spent some time developing a good airfoil, and he has successfully reproduced it here for all of us. The Toni is a super-fast airplane, and it absolutely explodes out of the turns. Working with 3/32" balsa skins requires ■ little craftsmanship to maintain this airfoil section, and the instruction manual provides guidelines that [redacted] quite adequate.

We used polyester resin to join the skins. This makes a nonsoluble [redacted] that should prevent those unsightly lines in the final finish. I said "should"—no guarantee.

We East Coasters have problems with humidity and seasonal temperature changes which keep Southern Californians in Southern California. This phenomenon does affect the appearance of a model six months after it is finished.

(Cont'd next page)

Out of three kits we had for inspection, we rejected only one piece of balsa. It was a piece of trailing edge stock that was too heavy. That piece of wood did not go altogether unused. It has seven hash marks on it, one for each devastated "Dipteron." To be serious, I felt that it would have put the wing out of balance. Balsa selection is difficult and expensive for a kit manufacturer. I think that few other kit makers could boast such a low rejection rate.

Landing Gear: The landing gear is a problem area with most pylon kits, but it's a breeze to complete with this one. Every part is supplied and every detail attended to, down to the dimple molded into the wheel pant to accept the flat-head axle bolt. All that is required of you is to cut some slots for the wheels and strut clearance. Be careful that the mold flashing inside the pant does not interfere with wheel rotation.

Because the left wheel retainer has a right hand thread, it will tend to back off on a hot landing. Simply gum up the threads with Lock-Tite or epoxy to prevent this. The end of a soldering iron on the bolt head will allow you to remove it when necessary.

The landing gear strap can be permanently built into the wing, as pictured, or made removable. The latter system will cause less damage in the event of a terrible landing.

Tail Feathers: Although these are the simplest structures to accomplish, take care. This is no place to cut down frontal area. With today's exciting speeds, these load-bearing surfaces should be firm and able to resist any harmonic fatigue. The 1/64" ply

(Continued on page 106)

(Continued from page 105)

strips inserted into the pre-cut slots of the fin and stab serve ■■ ■ good line to sand to. These also prevent aerodynamic stresses from tearing the stab off.

Finish: The strength, beauty and durability of the K&B "Matched Finish System" is, in my opinion, the best way to complete your Little Toni. If your model should survive mid-airs, wake turbulence, radio glitches or just plain pilot error, it will ■■ protected from fuel and moisture for many ■■■■ of flying. The upwards-of-30 Gs encountered at both ends of the race course tend to fatigue the balsa surfaces quickly if they are not covered with the 3/4 oz. glass cloth and resin.

After sanding the second coat of resin, I brush two coats of K&B primer over the entire model. This provides ■ good sanding base and cures the pinhole problem of the fuselage. Sand almost all of this primer off with 220 and then 320. Now spray on one more coat of primer, sand this ■■■ with 400 paper, and you're ready for color paint.

The twin Tonis pictured duplicate Toni Le Vier's original paint scheme. The cream color ■■■ mixed using white, with a few drops of yellow and black. The red is three parts K&B red to one part orange. Vinyl racing numbers were applied for masking over ■ base coat of cream, then the red ■■■ sprayed. The models were wet-sanded with 600 paper, and then lines and rivets were applied with ■ drafting pen and permanent ink. Two coats of K&B clear provided the final gloss and protection of the detail work and decals.

Use your test flights to really analyze the model's flight characteristics and trim it properly. Full up elevator should be necessary to negotiate the number one turn. Aileron throw should ■■ only enough to get you into position for the turn. I'■■ confident that most racers have too sensitive ■ control setup, as evidenced by some pretty wild flights. The less control movement you have to play with, the less obvious will be your first-race-nerves problem.

Little Toni No. 1 won its first competition in Ballston Spa, N.Y., with a best time of 1:20 (in the rain). No. 16 was doing great in the hands of Eric, until it lost some tail feathers in a takeoff accident. Pete Read's prop really did a job on the rudder and right elevator. Using his head, Eric cut the engine, aborting the takeoff, and saved the airplane.

Terry has set ■ blistering pace for the rest of us. One of the main ingredients of his success is neatly packaged in a box at your local dealer—how can you refuse the challenge?

Within the last few months Terry flew his Toni to first place at the Annual NMPRA Championship in Florida. The author placed second at the ■■■ race. In another part of the world, Mr. Nurakemi set a Japanese pylon speed record of 1:22 on Nov. 17, 1974.

Specifications: Wingspan—50"; **Wing area**—475 sq. in.; **Engine**—40; **Weight**—5 lb.; **Construction materials**—fiberglass foam, balsa. **Price:** (deluxe kit) $99.95; economy kit (no balsa or miscellaneous hardware) $69.95. **Manufactured by**—Prather Products, 1660 Ravenna Ave., Wilmington, Calif. 90744.

SUPERTIGRE X-40

(Continued from page 61)

engine blew one plug per run and really didn't

to like the fuel. Revs increased only 400 rpm over the 40% nitro fuel. Perhaps fuel "tuning" will do the trick, or some work on the head. The stock engine really didn't pick up as much it should on high-nitro fuel.

Now to the good part: over 1.8 bhp on the test engine! Won't take much now to see the magic 2 bhp on .40. The port timing is conservative: exhaust is 31% of the stroke, and leads the transfers by .065". Hop-up specialists will be working timing and head designs on this one to extract balanced performance from fuels with varying nitro contents. A mini-pipe or megaphone can add around 1000 rpm to this engine before resorting to higher-power, tuned pipes.

It appears that the basix X-40, with appropriate accessories (RC throttle, muffler, mini-pipe to tuned pipe) and slight timing and head changes, would be an appropriate engine for all 40-powered events, including RC Pattern.

Specifications: Price—$65.00; **Distributor**—World Engines, 8960 Rossash Ave., Cincinnati, Ohio 45236.

TODI

(Continued from page 61)

ply that is supplied. I finished my Todi with rubbed epoxy on all but the wings, which were covered with Solarfilm.

My Todi required 1/2 oz. of ballast in the nose to achieve proper balance. If the more normal finish of MonoKoted or Solarfilm tailboom is used, the Todi will come out nicely nose heavy. Several hand glides were made off a hill to trim for straight flight. This re-

(Continued on page 110)

POLING

(Continued from page 85)

The three-pole motors often draw more current than the five-pole motors, and silver solder may be needed for the commutator connections to withstand the heating (at 10 amperes or more). The Plymouth washer motor, the Mabuchi RS 34 (or RS360), and 1/24 scale slot car motors make satisfactory .020 units.

Basic equipment required to develop your own unit is an ammeter, and either a good ear or a tachometer. The inexpensive $2.00 meters should do just fine.

(Continued from page 109)

quired some minor linkage adjustments.

The first launch [illegible] made using a two-year-old hi-start. The Todi went up straight with few corrections required, other than some up trim at the top of the launch. Based on experience, I would say the glide is equal to most other popular designs. Penetration into 8 mph winds [illegible] better than expected, and landing was routine.

Rolls are easy [illegible] moderate speed build-up is obtained. Landings with full down-flaps and some down elevator make for a steep, slow-but-solid descent.

The Todi [illegible] designed for the experienced modeler. The kit is not difficult to build, but does require much fitting. The radio compartment size is limited and will accept only the modern, small-sized systems. Aside from this, it is beautifully designed, exceptionally engineered, structurally adequate, and a fine flyer.

Since construction of this test model, the kit has been changed in a few details. Instead of an aluminum tongue at the wing/fuselage joint, steel rods are now featured. Also, 3-ft. balsa stock for wing sheeting is used, with good instructions on splicing. Wing parts, for both the 76" [illegible] 100" span, [illegible] complete. This is the most impressive item, in that two complete wing sets can be built and flown.

Specifications: Wingspan—100-3/8"; **Wing area**—700 sq. in.; **Wing loading**—7.2 oz; **Airfoil**—Eppler 387, flat bottomed; **Elevator**—All flying; **Price**—$74.00; **Manufacturer**—Dodgson Designs, 2904 Southwest Camano Drive, Camano Island, Wash. 98292.

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LUCKY PENNY

(Continued from page 49)

the triangles and twist the blades so

they are parallel to the jig. Make sure that, when the blades are parallel to the jig, the prop shaft is perpendicular to the building board.

Tissue wing sockets are made on the shank of a 3/32" drill bit. Cut pieces of Jap tissue approximately 1/2 x 3/4". Moisten the 1/2" edge of the tissue with glue and stick the 1/2" side to the drill bit. Brush thick glue (Ambroid is excellent) on the tissue. Wrap the tissue around the bit and immediately push it off. Allow them to harden for about 15 min. before trimming to size.

To position the wing on the motor tube, the CG must be found. Attach the prop to the motorstick assembly. Hook piece of rubber from the prop shaft to the rear hook. Balance the assembly and mark the CG. Position the wing posts so that the front post is 3½" ahead of the CG, and the rear post is 2 3/4" behind the CG.

Flying the plane is simple. If directions were followed closely, the plane should fly on 16" loop of .080 Pirelli. Start off with about 500 turns. Adjust the incidence or wing angle to give slow, smooth flight. After the plane is adjusted to fly 500 turns, the turns can be increased. In my winning flight the 1972 NATS, more than 1600 turns were packed into a 17" motor of .080 Pirelli.

Indoor balsa and indoor supplies like thrust bearings, glue, boom forms, Micro-lite, rubber, etc., can be purchased from: Micro-X Products, 5200 Seven Pines Dr., Lorain, Ohio; and Aero Lite Model Supplies, 36659 Ledgestone Dr., Mt. Clemens, Mich. 48043

INFECTIOUS MITE

(Continued from page 54)

support, provisions for HVAR rockets under the wing made it a real potential killer.

The design gross weight was upped to 1450 lb. and, with the larger engine, it achieved a top speed of 150 mph. With Al Mooney, well as military pilots, at the controls, the Army and Marine Corps were given impressive demonstrations of ground strafing and rocket runs. But no orders forth-

(Continued on page 112)

INFECTIOUS MITE

(Continued from page 111)

coming.

This occurred during a time of strange and almost nonsensical inter-service rivalries. When the dust settled, the Army was not allowed to have any fixed-wing aircraft equipped with armament. It was established that this was to be (and still is) an Air Force responsibility. Therefore, Mooney had to abandon this expensive promotion, and the Mooney M-19 "Cub-Killer" became extinct.

Then, in 1953, in order to protect his work force from Wichita's proselytizing aircraft companies, Al packed up the "Mite works" and moved it—lock, stock and welding equipment—to Kerrville, Tex. Here, production on the M-18-C-55 continued.

This larger, canopied Mite soon evolved into the Mooney Mark 20 family. Configured with the Mooney trademark (the backward tail), the four-seat Mark 20 was a solid airplane that achieved 180 mph on a 180 hp engine.

As soon as Mite production ceased, the airplane became collector's item. Clubs sprang up, and today there is a Mooney Mite Owners Assn. from which complete drawings and assembly manuals can be ordered. The association (Box 3999, Charlottesville, Va. 22903) has sent out several hundred sets of plans to potential home-builders. But, far, no home-built Mite has been completed.

Although basically just fun plane to fly, the Mooney Mite can earn its keep. Whether used an inexpensive vehicle for building up time toward a higher rating, or tow for gliders or banners, or even as a commuter airplane, its economic operating costs provide ideal transportation, especially for the individual long-distance traveller.

A California college student, Dan Shumaker of Livermore, has Mooney N-4142, and uses it regularly in order to visit his folks in Florida. Visits are great, but when it's time to return to California, Shumaker's canopy closes on his Dad's now-stock goodbye: "Son, it's just real shame knowin' you're flyin' the country with nothin' but a matchbox strapped to your ass."

That's okay, Dan, it's all envy. Just envy.

Pick Up That Dragging Tail

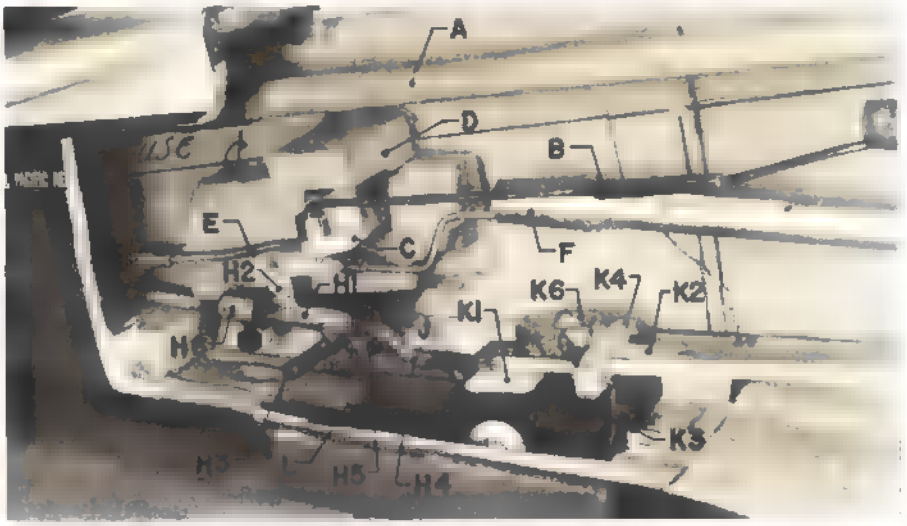
by Hank Pohlmann
written by Claude McCullough

Retract gear makers have made it easy for trike gear types with special, steerable nose wheel units, but none offers any solution to the problem of retracting a tail wheel. Since we've complained about the often-seen discrepancy of a tailwheel hanging out, it seems only right to suggest some ways of doing the job.

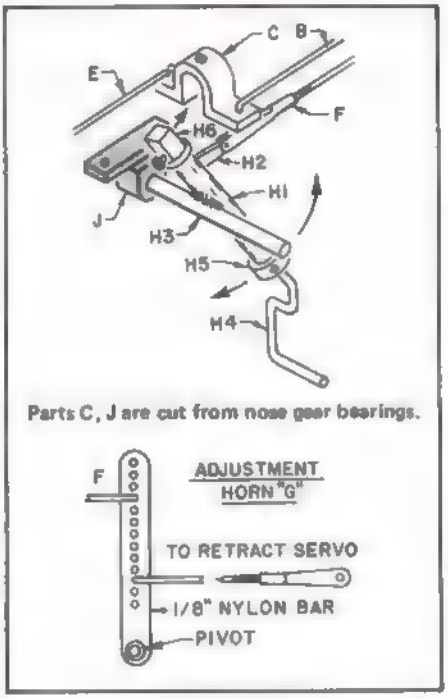
Just about every good operating example we've seen to date, like Karlsson's Corsair, or Santich's P-47, uses a separate channel and servo to retract the tail wheel, thereby avoiding the knotty matter of a linkage hooking the rear action to the main gear cycle. Not that it couldn't be done, but disconnecting the wing for transport would get tedious.

Most gear units have their work cut out for them retracting the heavily detailed main gear, without the burden of added load from a tail wheel. If room is available in the fuselage, there is probably no mechanical [illegible] why a steerable nose gear unit could not be adapted for tail wheel use. The disadvantage to this approach is the amount of unnecessary weight this would put in the rear, something no scale job really needs. Karlsson went to the trouble of concealing his tail wheel drive unit in the pilot's seat, just to keep the CG as far forward as possible.

Hank Pohlmann has a simple and easily scratch-built setup. Courtesy of a glitch with his Mustang's name on it, we are able to present a cutaway view of the actual mechanism installed in the fuselage. (Quit crying, Hank!) **"A"** is the elevator pushrod, positioned to pass over all the gizmos below. **"B"** is the pushrod from the rudder servo. It drives nylon part **"C"**, which is cut from a regular Sig, Rocket City, Top Flite or similar nose gear bearing. **"C"** pivots on the overhead, hardwood crosspiece **"D"**, driving the pushrod **"E"**, which goes on to the rudder horn. **"F"** is the retraction pushrod from the servo or operating unit (Hank used a Rom-Air unit).



Hank Pohlmann's retractable tail wheel arrangement.



Parts C, J are cut from nose gear bearings.

To get just the right amount of pushrod travel to lift the tail wheel up and close the doors, a nylon horn **"G"** is installed in the pushrod, near the drive unit farther forward in the fuselage. By shifting the linkages to the various holes in this horn, the required movement is obtained.

"H1" is a brass tube body to which has been silver-soldered brass horn **"H2"** and a 5/32" axle **"H3."** **"H3"** pivots on pillow blocks **"J."** **"J"** is also made from a nylon nose gear bearing and screwed to hardwood pieces **"K"** on each fuselage side. For clarity, the pillow block **"J"** on the near side of the photos has been removed, along with the side and hardwood piece **"K."**

The 3/32" tail wheel wire **"H4"** pivots inside the brass tube body **"H1"**, and is held on with wheel collar **"H5"** at the bottom, and a specially made collar **"H6"**, at the top. **"H6"** has been filed square and fits into a square hole in the back of **"C."** Thus, when the wheel is down, **"H6"** keys into the square hole in the back of **"C"**, and the tail wheel steers in response to the movement of the rudder servo. When pushrod **"F"** initiates a retraction cycle, **"H6"** is pushed out of the back of **"C,"** leaving **"C"** free to operate the rudder.

As the wheel comes up into the well, it strikes pedal **"K1"** on a pedal bar, **"K2."** As the pedal bar rises, lift wires **"K3"**, fastened to the plywood crossbar **"K4"**, pull up the wheel well cover doors. The **"K3"** wires are equipped with a V-bend in the middle, to allow fine tuning along the length for proper door closure. A simple strip nylon hinge **"K5"** will suffice for the pedal bar at the far end, and a lead weight **"K6"** helps hold the doors open when the wheel is down. The pedal bar is 5" long in this case, but the exact length is not critical. A hardwood bumper **"L"** is built into the fuselage structure and takes the impact load of the tail wheel wire during hard landings. This helps prevent overloading the top nylon part **"C"** and the tail wheel retract servo, or drive unit.

It probably is a good idea to make a mock-up of the parts and check the operation before installing the system in a model. This allows basic adjustments of the horns and linkages out in the open, where they are easy to modify, if required.

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THOMAS-TUNED DYNA-JET heads held all 3 records during 1974. For information write Jerry Thomas Products, 503 E. Wright Ave., Tacoma, Wash. 98404.

(Continued from page 101)

weigh in your consideration of radios unless you know there is a severe interference problem in your area.

We talked about the specific qualities of an RC system that affect range and noise resistance like they are fixed quantities that can be stamped on the cases and will never change. This might be true if you kept the whole system in a controlled environment with constant temperature and humidity, as well as free of shock or vibration. Even then, some of the characteristics would change gradually due to component aging. This brings up the next topic: *stability*.

It is incumbent on you, the modeler, to take reasonable precautions in your radio installation to prevent shock, vibration and moisture intrusion from degrading performance of the radio. However, in normal use, the radio will be subjected to a wide range of temperature, some vibration and a range of humidity. The radio should be designed to be tolerant of these conditions. At the extremes of temperature, there may be some reduction in sensitivity, or even some drift in servo neutral position.

More points on evaluating a radio rig the next time.

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OFF THE SCENE

"Oh, Howard,...what will it matter in two thousand years!"

"Hey, Honey-Bun! Don't get under there, you'll drip on the radio."

Compact *and* Complete

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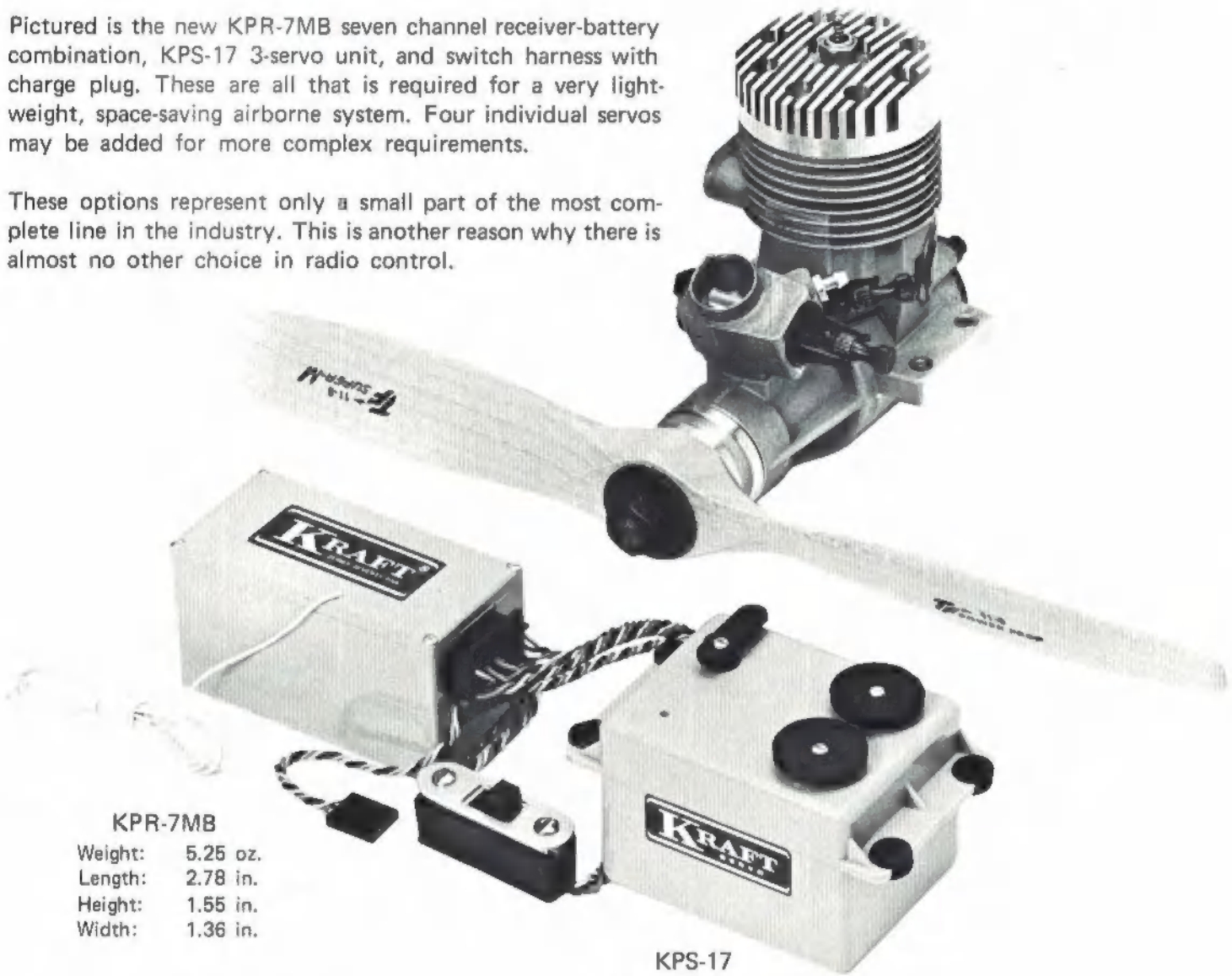

KPR-7MB

Weight:	5.25 oz.
Length:	2.78 in.
Height:	1.55 in.
Width:	1.36 in.

KPS-17

Weight:	4.7 oz.
Length:	2.42 in.
Height:	1.71 in.
Width:	1.87 in.

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450 WEST CALIFORNIA AVENUE
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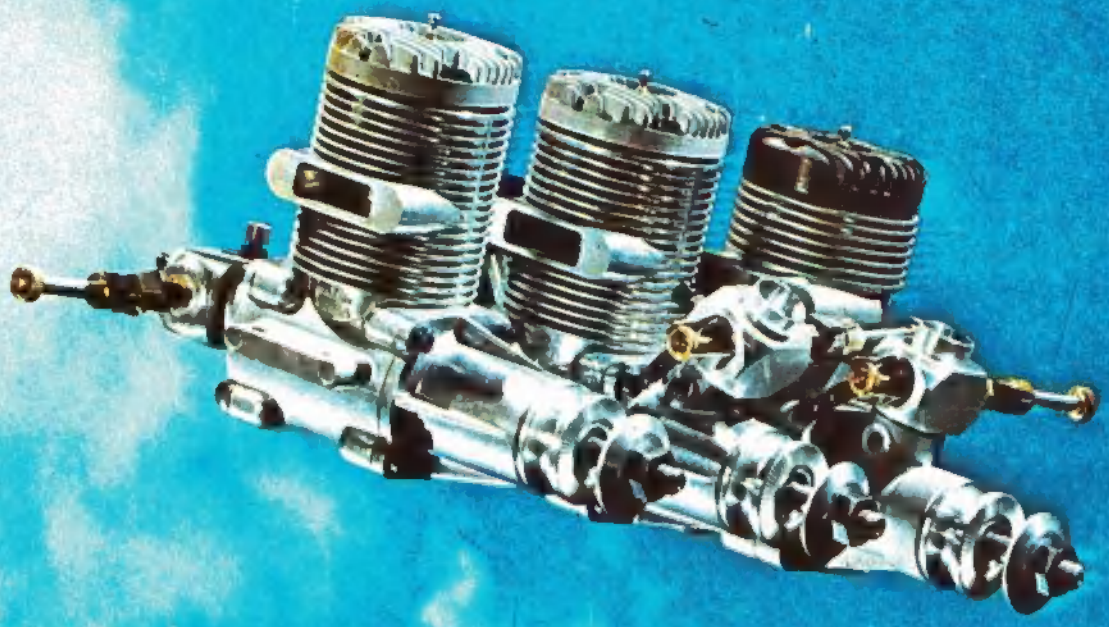
World's Largest Manufacturer of Proportional R/C Equipment



MRC Webra Powerline

In 1967 a new star emerged on the power horizon in the form of the MRC/Webra 61 and just two years later it reached World Championship status in the hands of Bruno Giezendanner. This was the near legendary Blackhead that has dominated local, national and international pattern and scale competition for all these years. The Blackhead continues as a mainstay of R/C powerplants in 1975 through refinements that raise its already impressive power level while retaining its ultra reliability.

For those modelers requiring reserve power for large, heavily loaded scale ships or today's FAI vertical pattern maneuvers, MRC/Webra now offers a Schneurle ported Speed 61 in front and rear rotor versions. Speed 61 powered Hanno Prettner's first place and Wolfgang Matt's second place winners at the 1975 Las Vegas Tournament of Champions. Both front and rear rotor engines develop torque of 120 oz. in. at 9000 to 10000 rpm and peak brake horsepower of 1.5 at 15000 rpm placing them in front of R/C's horsepower derby. Equally impressive is the Speed 61's ability to handle large diameter/pitch combinations for scale work.

Webra's Powerline also has a .40 size version of the famed Blackhead. This scaled down version provides exceptional power in its class with reduced fuel requirements essential to any cost conscious sport flyer. Truly a member of the Webra family, Blackhead .40 has the same high compression, low friction ball bearings and piston/cylinder type as its bigger brother.

Other MRC/Webra engines include an .09 Diesel, the World's endurance record holding .15 Diesel and a .20 Glo Star, all ideally suited to smaller sport aircraft and sailplanes.

All MRC/Webra engines, .40 and above, feature the TN Automix carburetor that provides maximum power output, reliable idle and smooth power transition. Simple to set up, the Automix carb holds its settings over long periods of time.

As expected from the leader, materials and workmanship are maintained at highest levels, insuring long life and dependability—solid reaons to plug your next project into our "Powerline"!

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